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WORKING PLAN

OF THE

FORESTS NEAR DARJEELING.

Prepared under the supervision of the Conservator of Forests

BY

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PREFACE.

WHILE submitting this draft Working Plan, the undersigned requests permission to point out, as he and other officers have done on several previous occasions, that the principal obstacles to the well-being of the forest are the grazing and attendant practice of lopping.

He hopes that the time will come when Government will realize what these hill-forests have suffered and are suffering, and will insist on the milk-men stall-feeding their cattle.

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DARJEELING,

The 29th July 1887.

CONTENTS.

DARJEELING FOREST WORKING PLAN.

PREFACE.

CHAPTER I.

GENERAL DESCRIPTION AND STATISTICS.

	Paras.	Pages.
(1) Administrative circumstances—		
Situation	1	1
Origin	2	...
Legal status	3	...
Areas excluded	4	...
Boundaries	5	2
Areas	6	...
Beats, compartments and groups	7	...
Adjoining estates	8	...
Charge, pounds, camping grounds	9—11	...
(2) Physical Conditions—		
Situation	12	...
Climate	13	3
Soil	14	...
Description of crop	15	...
(3) Economic circumstances—		
Demand	16	4
Supply of timber, fuel, fodder, grazing	17—19	5
Damage done by grazing	20	...
Outturn of recent years	21	...
Future demand	22	6
Labour	23	...
Roads and buildings	24—26	6—7
Control over grazing	27	7

CHAPTER II.

DETAILED DESCRIPTION OF FOREST.

Description of compartments and beats	28	8—14

CHAPTER III.

WORKING PLAN.

(1) Regulation of fellings—		
Working circles	29	14
Method of treatment	30—31	...
Principal fellings	32	15
Selection of capability	33	...
Working tables	34	...
Groups or check-areas	35	15—18
Application of the check	36	18
(2) Grazing—		
Grazing tables	37	18—19
Location of graziers	38	20
Examination of forest before opening to grazing	39	...
Increase of grazing to be discouraged	40	...
Grazing rules	41	21
(3) Fodder—		
Fodder supply tables	42	...
(4) Planting and Sowing—		
Re-stocking blanks and fencing	43	...
Annual sowings	44	22
Nurseries	45	...
(5) Roads and Buildings—		
Roads and paths and buildings to construct	46	22—24

	Paras.	Pages.
(6) Sylvicultural treatment—		
Regeneration or principal fellings, "First" and "Second" ...	47—51	24—25
Improvement cuttings, cleanings, thinnings	52—54	25
Jardinage fellings	55	26
(7) Estimation of capability—		
Forecast, method of calculation of	56	...
Do., result for first period of 3 years	57	...
General capability...	58	27
Reserve stock of fuel	59	...

CHAPTER IV.

CONTROL.

Outturn	60—62	...
Maintenance of compartment lines and boundaries	63	28
Forest journals	64	29
Record of result of operations	65	...
Responsibility of officers for execution of fellings	66	...
Control over fellings	67	...
Penalties and prohibitions	68—69	30
Control over grazing	70—71	30—31
Abstract of operations for first 18 years	72	31

APPENDICES.

Appendix 1	Record of graziers	i
Ditto 2	Grazing rules	ii
Ditto 3	Forecast of outturn for first period	iv
Ditto 4	General capability	v
Ditto 5	Description of compartment lines	vi
Ditto 6	Memorandum. Supply to Cinchona Department	x

CHAPTER I.

GENERAL DESCRIPTION AND STATISTICS.

(1).—*Administrative circumstances and Legal Status.*

Situation.

1. The forests of the Darjeeling Forest Sub-division are situated on a huge spur of the Himalayas forming the watershed between the Teesta river and its tributaries on the east and the Tambar (a river in Nepal) and its feeders on the west. The numerous smaller spurs rising from the plains and these main valleys combine and form the mountain ranges known locally as the Senchal and Tukdah ranges, which in due course unite and form the Goompahar Range; this last is in its turn joined by other spurs and, after several changes of name, rises up to the snow-clad chain of the Himalayas near Kanchanjanga.

The forests treated in the following Working Plan are those situated on the portions of the above three ranges which join at the Jor Bungalow saddle, at an elevation of about 7,400 feet above the sea, situated about four miles south of the station of Darjeeling.

The forests cover the upper portions only of the ridges and slopes of these ranges, at all aspects, at elevations varying between 8,600 feet and 5,000 feet, this distribution being principally due to the circumstance that when the protection of forest in the district was first started in 1865, the hills were generally all under forest, and all such forest land above an elevation of 6,000 feet was excluded from the sales of waste land.

These forests are in that portion of the Darjeeling district known as British Sikkim, part of which, including probably all the forests concerned in this plan, was ceded to the British Government by the Raja of Sikkim in 1835, and, after the military expedition of 1850, taken and retained by the former.

Origin.

2. All these forests have been declared "Reserved Forests" under Act VII of 1878. The number of the section of that Act under which they were so notified, and the date of the notification in each case, is recorded in Appendix A to the annual report of the Bengal Forest Department for 1885-86.

Legal status.

3. In the case of the forests notified under section 19 of the Act, the necessary enquiry concerning rights prescribed by chapter II of the Act has been held, and in each case the forest has been declared free of all rights. As regards the forests notified "Reserved Forests" under section 34 of the Act, a report was forwarded by the Conservator of Forests to the Government of Bengal in his letter No. 302 Camp of 7th March 1886. These last forests came into the possession of the Forest Department at different times between the years 1865 and 1879. As far as the Forest Department is aware, no rights have ever been exercised in any of these forests, nor has any claim to rights been preferred.

In appendix 6 is copy of a memorandum of 1880 by which the Cinchona Department is given power to cut certain produce in certain forests without reference to the Forest Department.

Areas excluded.

4. It should here, however, be mentioned that there is a dispute of long standing between the Forest Department and the Land Mortgage Bank, Limited, concerning a portion of the Dawaipani Beat. The land under dispute has been declared to belong to Government in the Forest Department in proceedings under the Bengal Survey Act [V (B.C.) of 1875], and the question is now merely one of possession. The disputed area has not been included in this Working Plan.

There has also been excluded from the provisions of the Working Plan a piece of land occupying the north part of the Senchal Range, which the department may have to transfer to the Military Department, and an area of about 11 acres forming the Jor Pokri location.

There are other forest areas belonging to the Darjeeling Forest sub-division, which, being situated at too great a distance for easy working, have been omitted from the provisions of the Working Plan.

Boundaries.

5. The boundaries of the forests are described generally in the *Calcutta Gazette* notification above referred to. They have all been surveyed and mapped except in cases where they coincide with well-marked natural features or roads, and are laid down on the ground by cleared boundary lines and rubble masonry pillers. Detailed information concerning these boundaries is filed in the Darjeeling Forest Sub-divisional Office in the "Record of Reserved Forests," which record includes boundary maps.

The forests treated of in this Working Plan are divided into two working circles. The general prescriptions apply to both circles, the detailed operations for each circle being laid down in its own table.

Areas.

6. The western working circle contains an area of 8,854 acres, the eastern working circle 9,169 acres. Total 18,023 acres.

Beats, compartments and groups.

7. A skeleton map is annexed showing the division of the forest into Beats and Compartments; the Beats being useful for purposes of control; the compartments being useful as sub-divisions of Beats, and assisting in localizing the annual fellings, although the areas of these fellings will not necessarily correspond in any one year with the limits of a compartment. These compartments are the smallest areas into which the exceptionally difficult configuration of the ground rendered sub-division of the forest practicable. The compartments have been grouped into areas termed "groups" or "check areas," the object of which is explained further on.

Adjoining Estates.

8. Generally speaking these working circles are surrounded by tea estates

Charge.

9. From the introduction of this Working Plan, each working circle will be under the charge of a forest ranger with a forester under him to assist, the number of forest guards available admits generally of one man being in charge of two beats.

Pounds.

10. To facilitate the suppression of unauthorized grazing, the following pounds are sufficiently convenient:—

Western Working Circle. Pounds at Jor Pokri, Jor Bungalow, Sonada and Kurseong.

Eastern Working Circle. Pounds at Jor Bungalow, Rangli-Rangliot, Sonada and Kurseong.

Camping grounds.

11. A notification issued by the forest officer annually under the rules of the 15th December 1880 fixes a number of camping grounds on the sides of the roads in which alone all travellers, sawyers, wood-cutters and others are allowed to camp. The only persons allowed to live inside the forests off these authorized camping grounds are charcoal-makers who camp near their kilns, and persons holding grazing permits who live at their grazing camps (*bathans*). Sawyers cutting up timber for permit-holders infringe this necessary rule unless carefully watched, and, besides endangering the forests from fire, cut and utilize saplings, &c., for their huts. In the case of persons living beyond a few days on these camping grounds, a fee of four annas a month per hut is charged, otherwise they would unnecessarily settle on them.

(2).—*Physical Conditions.*

Situation.

12. The forests as above shown cover the upper portions of the ridges and slopes of the hills. Every aspect is met with; generally speaking slopes with a southern aspect are more gentle than others. One of the natural results of this is that the forests on the southern slopes are in greater favour as grazing grounds, the result being that the soil is poorer and the forest has suffered more.

Roads and paths being scarce, it is generally difficult to get about the interior of the forests except by following *up* the spurs.

13. The climate of these hills is very damp. There are no statistics of the rainfall inside the forests. Dr. Hunter, writing in 1876 of the station of Darjeeling, gives 127 inches as the average for the previous nine years. A register kept by the manager of the Mim Tea Estate, situated some little distance below the forest line on the north side of the Goompahar Range, shows 147 inches as the average of the last seven years, and the register kept at Seyoke on the south side of the Goompahar Range, below the forest boundary, gives 105·94 as an average for the two years that it has been kept. This rain was distributed as follows: —

Climate.

	Mim.	Seyoke.
January	1·07	0·22
February	1·74	0·19
March	3·11	8·96
April	5·25	2·69
May	12·06	10·00
June	30·99	21·99
July	32·73	26·18
August	32·00	19·13
September	20·73	18·34
October	6·01	2·05
November	·41	1·00
December	·58	0·19
	146·68	105 94

The rainfall varies considerably from place to place, and even between two adjacent tea estates. The rainfall at Mim is probably above the average. The rainfall at Margaret's Hope Tea Estate, situated below the Sonada forest, was—

In 1884	78 21	inches.
„ 1885	122·99	„
„ 1886	114·16	„
Average	105·12	„

Parts of these forests, more especially those of a southern aspect, are enveloped in mist for more than half the year, and, as a consequence of the damp, in many of the forests the stems of the trees are clothed with thick moss. The prevailing wind is from the south.

Frosts are very frequent during the winter months from December to March, and once or twice in the year there is generally a fall of snow. This snow seldom lies more than a few hours, but occasionally, as in February 1887, it lies for three weeks and more.

14. The underlying rock is generally gneiss. In places it takes the character of mica schist. This rock decomposed, forms a hard, stiff, clayey soil, red or yellow in colour, with the rock protruding here and there. In places protected for years by the close canopy of big forest, in which the soil has been undisturbed, there is a fair surface-soil of vegetable mould from three to nine inches in depth, in which the seedlings find plenty of nourishment; but in others, where there has been much grazing and the vegetation has been destroyed, where the soil has been trodden down, and the lopping of the tree branches, formerly much more general than now, has allowed the heavy rain to beat on the surface of the ground and the sun to burn up the soil, this hard clay is exposed, the seed is unable to find the conditions necessary for germination, and the few seedlings that do spring up soon die off. As a consequence of the shallow nature of the soil many of the trees, particularly the older ones, are stag-headed; but this is also often more directly due to the practice of lopping. Examples of good soil may be seen in the Rishihat and Rangirum Beats, each of which has a northern aspect and has been protected for years from grazing. As samples of poor soil may be mentioned the Balasan and Sepoydura Beats, which have been heavily grazed.

Soil.

15. The forest is an irregular high-timber forest of mixed species in which all classes of tree are represented, from the sapling to the over-mature oaks and chestnuts, frequently hollow, of over twenty feet in circumference.

General description of forest crop.

The crop is, generally speaking, complete and the growth is seldom stunted. In those areas in which grazing has been practised, saplings are scarce and seedlings do not exist; but otherwise the forest throughout maintains this character of irregularity, and no portions are composed exclusively of poles or of any other one class of tree. Along the lower edges of many of the beats the forest has been destroyed by clean-fellings in former years, by cultivation and heavy grazing. There are frequent blanks of two to ten acres in extent in the heart of the forests the sites of former or existing grazing camps (*bathans*); and in the places heavily grazed in which the lopping of the tree branches has been practised, the forest does not form canopy or the cover is light; but in the forest in its natural state which has been spared from grazing and heavy fellings the state of canopy, generally speaking, exists.

In portions of the forest that have been closed against grazing and heavy fellings for some years, natural reproduction in the vegetation of inferior species is good, for instance, of kharani (*Symplocos*), jhingni (*Eurya*) and others; so is the reproduction of maples, and the above species of themselves soon form thicket under the cover of the mature forest, and protect the soil. The trees of the best kind, magnolias and oaks, reproduce themselves sufficiently well. Magnolia seedlings are more common than those of oaks or chestnuts; the soil being generally shallow owing to causes already explained, the large fruits of the oaks and chestnuts are not so easily covered and do not find the necessary conditions for germination. Again, this circumstance exposes them to the ravages of the squirrels.

In many parts of the forest a species of balsam (*Impatiens*) from 2 to 8 feet in height, called "kibu," forms a complete covering to the soil. At an elevation of about 7,000 this kibu gives way to a small bamboo (*Thamnocalamus*) called "maling" by the natives. The best trees are the following:—

Búk or bajarat	...	*Quercus lamellosa.*
Phalat ...	...	*Quercus annulata.*
Katus ...	...	*Castanopsis rufescens.*
Katus ...	...	*Quercus pachyphylla.*
Champ ...	...	*Michelia excelsa..*
Kawala ...	...	*Machilus odoratissima.*

Including the accessory trees, which are much more plentiful and of more importance to the well-being of the forest as a whole, the stock consists of—

Paieli ...	...	*Daphnidium elongatum.*
Kawala ...	...	*Machilus odoratissima.*
Kabashi ...	...	*Acer Campellii and lævigatum.*
Kharani ...	...	*Symplocos lucida.*
Búk ...	...	*Quercus lamellosa.*
Phalat ...	...	*Quercus annulata.*
Katus ...	...	*Quercus pachyphylla.*
Jhingni ...	...	*Eurya.*
Lepchaphal ...	...	*Phœbe attenuata.*
Dudila ...	...	*Ficus gemella.* (Dudila of Gamble's list of trees; Dudhia of the grazing rules).
Chindia ...	...	*Brassaiopsis.*
Gobria ...	...	*Echinocarpus dasycarpus*, and others with a few
Pipli ...	...	*Bucklandia populnea.*

The above trees are arranged approximately in the order of the numbers in which they occur. The maling bamboo (*Thamnocalamus*) is very common in some of the beats and is used largely for fodder, as also is a shrub called kibu (*Impatiens Roylei*). Climbers are neither numerous nor large.

(3).—*Economic Circumstances.*

16. These Working Circles are required to supply timber, fuel, both as firewood and as charcoal, fodder and grazing.

Demand.

During the last few years the demand for building timber has been heavy and, as trees for this purpose were sold on permit from all parts of the forest, the nearer beats have been nearly drained of suitable trees. The Department has also been forced to refuse several applications for large quantities of timber. This Working Plan prohibits all felling of trees, except in any given year on the limited areas allotted to the fellings of that year.

17. Purchasers of trees for timber must necessarily therefore resort to the forests beyond these Working Circles, except that the few remaining timber trees will be made available with the fuel year by year as the different compartments are worked.

Supply of timber.

18. The forests will be worked principally with a view to maintaining a constant source for the supply of fuel to the station of Darjeeling and the military cantonments at Jalapahar. They will at the same time furnish cut fodder.

Supply of fuel and fodder.

19. Provision has also been made for keeping open to grazing the areas necessary for the supply of milk to Darjeeling and Jalapahar. This has been arranged by prescribing a rotation of grazing areas.

Supply of grazing.

20. It may here be mentioned that the demand for fuel and timber equalling the capability of these forests, it is regretable that it should also be necessary to have to provide grazing, because even with a system of rotation which allows the closing of each portion of the forest in its turn for a period of 50 years, the damage done by this grazing is so great that the quantity as well as the quality of the yield of the forest is seriously affected by it. This damage is greatly enhanced by the habits of the Darjeeling grazier, who, living inside the forest and clearing camping grounds and erecting *bathans* or sheds on them, reduces the productive area of the forest and consumes himself a certain quantity of its yield, and further is in the habit of cutting down on all sides of his *bathan* the saplings and poles that he finds convenient for his purpose and of lopping trees for fodder. This practice it has been found up to date impossible to stop. In addition to the above, the grazing rules passed under the Forest Act allow the lopping of certain trees for fodder, which also reduces the productiveness of the forest. In short, if it be found possible in the future to release these forests from this scourge of grazing by substituting the stall-feeding of the cattle or any other means, Government ought to do so, as it is impossible to work the forest up to the maximum of its capability for fuel, timber and fodder while grazing as now practised is allowed.

Damage done by grazing.

21. The quantity of produce removed during the last few years from these forests, taking the two working circles together, is as follows:—

Out-turn of recent years.

Year.	Number of trees felled.	Out-turn in cubic feet solid wood.					Fodder.	Grazing.			Other produce.		Remarks.
		Trees felled.	Logs.	Scantling.	Fuel.	Total.		Kind.	Number of animals for which one month permits were issued.	Revenue.	Kind.	Revenue.	
							Rs.			Rs.		Rs.	
1882-83	590	147,500	9,977	4,867	450,648	612,892	324	Cows ...	3,300*	1,650	Cane	60	* Up to December 1882 the fee for buffaloes was the same as that for cows, as S and the records did not specify the class of animal. The figure 3,300 consequently includes number of buffaloes.
								Bullocks	184	92	.....	.....	
								Buffaloes	123	123	.....	.....	
1883-84	405	101,250	7,848	2,452	370,829	482,379	488	Cows ...	2,165	1,082	Cane	36	
								Bullocks	625	313	.....	.....	
								Ponies ...	76	38	.....	.....	
								Buffaloes	135	135	.....	.....	
1884-85	533	133,250	10,015	690	505,070	649,025	632	Cows ...	2,966	1,483	Cane	72	
								Ponies ...	87	43	.....	.....	
1885-86	145	36,250	15,142	580	395,532	447,504	751	Cows ...	2,699	1,350	.....	.....	
								Bullocks	440	220	.....	.....	
1886-87†	149	37,250	13,902	10,947	561,992	624,181	1,000	Cows ...	2,866	1,433	Cane	54	
								Bullocks	502	251	.....	.....	

† *Note.*—The figures for 1886-87 have been inserted since this working plan was drafted.

In calculating the quantity of fuel in cubic feet solid wood, the following equivalents have been taken:—

One maund of firewood = 1¾ cubic feet. timber solid.
Ditto of charcoal = 7 ditto ditto.

The trees entered in the second column are those sold for sawing to purchasers who select the largest only. The volume of a tree is taken as 250 cubic feet, the approximate average volume ascertained by several experiments.

The total out-turn for the year 1885-86 was ... ... 447,504 c. ft. solid

22. The out-turn of the year 1885-86 however was considerably below the average in consequence of smaller demand from the cantonments. The average for the four years ending with 1885-86 was 547,950 or in round figures 550,000 c. ft. The tea estates have been supplied with fuel from the forests immediately outside these Working Circles, and when these forests have been worked out (in about three years time) the Working Circles will be called on to supply this fuel. The average for the above four years for firewood and charcoal, principally the latter, was 59,000 c. ft., which raises the above figures to 609,000 c. ft. solid wood.

Estimate of future demand.

In the above figures it has been supposed that seven cubic feet of wood (solid) are required to produce one maund of charcoal. This does not allow, however, for the heavy wastage in the manufacture of charcoal and subsequent loss in dust before weighment on its leaving the forest, and 20 per cent. loss on the charcoal manufactured should be allowed for this wastage, or about 36,000 c. ft., so that the demand on the forest at the close of 1885-86 may be considered as 645,000 c. ft., a figure which has been since increased in consequence of the addition of a mountain battery to the troops at Jalapahar, and which does not take into consideration the indents for timber, amounting probably to 100,000 c. ft. a year, which the department has been unable to accept.

The proportion of charcoal to firewood varies considerably from year to year. In the year 1885-86, for instance, about 38 per cent. of the above quantity of fuel was removed in the form of charcoal. In the previous year it was about 25. Roughly speaking 30 per cent. of the timber used as fuel is made into charcoal.

The supply of fodder is shown in the above table in rupees. The rate charged for a permit for fodder is 8 annas per month per coolie making one trip a day. As a coolie removes about a maund a day, the quantity of the fodder removed can be calculated from the revenue realized. This fodder consists principally of bamboo leaves.

As regards the grazing, a distinction has to be made between the different animals, because buffaloes which grazed formerly in these forests are now prohibited by the grazing rules passed under the Forest Act, as also are sheep and goats.

The Forest Department is not bound to supply grazing to ponies, and the number of bullocks requiring grazing is gradually diminishing.

The rules, however, do require the Department to supply grazing to cart cattle if necessary. The numbers given against the different kinds of cattle represent the number of animals for which one-month grazing permits issued, the unit being one animal grazed for one month. The average number of cattle grazing daily in the forest will be found by dividing these numbers by 12.

23. The following are a few of the rates paid for works:—Annual clearing of forest boundary lines, Rs. 5 a mile. Inspection paths can be made at Rs. 30 a mile and upwards. The paths made at the lowest rate are rideable in fair weather. Cutting lines through heavy jungle for plantation purposes Rs. 5 a mile. All other plantation work is done better on daily labour.

Price of labour.

The work of repairing and renewing boundary pillars is also done better on daily labour.

The periodical clearing of the compartment lines might be done under the control of the guard of the beat by two or three coolies on daily labour. The rate for coolies on daily labour is four annas a day, with 3 or 6 pies sirdari.

24. The following are the existing roads:—

IN THE WESTERN CIRCLE.

Cart roads.—The Hill cart road, which taps the Chattakpur, Pachim, Sonada, Rangbul, Dooterea and Goom beats, connecting these forests with Jor Bungalow and Jalapahar. Along this road runs the Darjeeling-Himalyan Railway as far as Jor Bunglow.

Roads existing.

The Goompahar cart road tapping the Tungsong Poobong and part of the Nai Beats; the other piece of this range is tapped by the Nepal frontier road, which is a continuation of the above-named cart road.

Besides the above there are the following inspection paths mostly ridable:—

The old military road running through the Chattakpur, Pachim, Sonada and Rangbul Beats with a branch through the Sonada beat to Senchal.

The Jor Bungalow Senchal road.

The Dooteria Beat inspection path.

The Tungsong and the Poobong inspection paths.

The paths to Mim, Chongtong, Tumsong and Rishihat, besides a forest foot-path on the north side of the ridge running through the Nai beat, and the old Goompahar road running through the same.

In the Eastern Circle.

Cart roads.—The only beat tapped by a cart road is the Chattakpur Beat, which can be worked by the hill cart road to Darjeeling.

A good broad riding road, known as the Jor Bungalow-Pashok road with its branch to Sureil and Mamrim, taps all the beats of this circle.

A bridle path through the Rangirum beat.

A steep path down the Rangnu spur.

A path up the Senchal-Tiger Hill beat spur and another down the Babu-khola spur with a branch from that spur to the Mamrim beat, together with a portion of the old military road traversing the Chattakpur beat, complete the list of existing roads in the circle.

Roads to be made.

25. The Goompahar cart road now tapping the Tungsong-Poobong and the Nai beats should be extended beyond its present terminus at Lepcha Jagat as far as the western limit of the western Working Circle, and for this purpose arrangements are being made with the Public Works Department.

A number of inspection paths are required to facilitate constant visits to every part of these forests. These paths will be constructed in the years fixed for this work in the appropriate part of the Working Plan.

Buildings.

The following are the existing buildings:—Inspection bungalows at Lepcha Jagat, Rangirum, Rangbul and Pachim, with a small inspection hut at Chattakpur above the cart road in the Chattakpur beat. Three range officers in charge of these forests live permanently in the houses built for them at Goompahar, Jor Bungalow, and on the Sureil road in the Tiger Hill beat. The construction of a few rest-huts to ensure the efficient inspection of the lower portions of some of the beats is prescribed in the appropiate part of this Working Plan. The forest guards, of whom there is about one man to each two beats, are provided with huts in or near their respective charges.

Control over grazing.

27. The control of the graziers is a matter of difficulty, and it is of great importance that they should not be allowed to unnecessarily increase the numbers of their cattle or of their *bathans*, or change the positions of these *bathans*, all which they are ready to do if not closely watched. With a view to enable the local officers to prevent unnecessary changes in these respects, it is considered desirable to put on record the number of cattle grazing on 25th May 1887, and the numbers and situations of the grazing camps as they now exist. This record will be found in appendix I to this Working Plan. The rules regulating this grazing were passed by the Lieutenant-Governor under section 75 (*d*) of the Indian Forest Act, and were issued in a notification of the 10th October 1885 with an addendum of the 19th November 1885. Under the grazing rules the divisional or sub-divisional officers alone can allow an increase to the number of cattle grazed, and registers are kept by the range officers in which his sanction is recorded in each case of such permission being granted. No range officer is allowed to act without this authority.

Under these rules the grazing of buffaloes, goats and sheep is now forbidden. These destructive animals can graze only in the forests beyond the jurisdiction of these rules.

CHAPTER II.

Detailed description of Forest.

28. In some cases each compartment is described separately, in others each beat, that is a collection of several compartments. The former method has been adopted in the cases of the forests to be regenerated within the next few years, as the present condition of the stock is of more importance in these cases. Another object is to show more distinctly the damage done by grazing in these forests.

Name of beat or compartment.	Description.
Balasan, 1 ...	Aspect southern. Slope steep, consisting of spurs and streams. *Area.*—187 acres. *Soil.*—Fairly deep with a thin coating of dead leaves. In places suffering from exposure. *Crop.*—Irregular, canopy incomplete, nearly complete in centre of the compartment, open in upper and lower parts. In upper part crop consists of big trees and scanty growth of poles all deformed, the tree tops being isolated and large gaps occurring, the result of heavy grazing and lopping. In the lower parts also the crop is thin, consisting of all stages of growth, the saplings and thicket bushes of jhingui predominating, while elsewhere different classes are in better proportion. Among the big trees, kawala predominates, then maples and then oaks. There is a total absence of seedlings. This compartment requires rest for 20 or 30 years'. Notwithstanding that fellings for charcoal are being executed in the lower portions, grazing is still going on.
Ditto, 2 ...	Aspect, &c., as in compartment 1. *Area.*—128 acres. *Soil.*—As in compartment 1. *Crop.*—Irregular, open, the trees are plentiful, but having poor tops do not form canopy. In the upper part the trees are scattered. The crop has suffered much from grazing. In the central portion the crop consists of small and large trees, maple and kawala predominating, and the crop is in places almost complete. In lower portions the crop is open and consists principally of badly shaped poles with a few young trees, principally maple. These poles are isolated but in fair condition. Seedlings not found. This compartment is still being grazed, although fellings for charcoal have commenced. Grazing bathans situated just outside the forest, below the boundary, should be removed if possible.
Ditto, 3 ...	Aspect, &c., as in compartment 1. *Area.*—62 acres. *Soil.*—Shallow, much exposed. *Crop.*—The lower part, about 23 acres, consists of low growth of kharani, jhingni, asari and brambles approaching state of thicket. In the rest of the compartment the crop is poorish, seldom forming canopy. Trees of all stages from saplings upwards, but saplings are rare. Maple and paielli predominate. The remarks above made about grazing in the upper portions and charcoal-making in the lower apply also to this compartment. The general condition is worse than in compartment 2.
Ditto, 4 ...	Aspect, &c., as in compartment 1. *Area.*—91 acres. *Soil.*—Poor shallow. Plenty of dead leaves but not favourably situated for decomposition. A large area occupied by a landslip in a stream leaving bare the quartzite rock. *Crop.*—The lower part, about 20 acres, contains little but brambles, and also contains a landslip in the stream. Crop consists of trees and large poles, which seldom form canopy. An almost total absence of small poles, saplings and thicket bushes, also of seedlings. In the upper part, near the road, many of the old trees are dead. This state is due to grazing.
Ditto. 5 ...	Aspect south. Slope steep and in lower part very steep. *Area.*—75 acres. *Soil.*—Very shallow, the clay subsoil exposed. Near grazing bathans large blanks with merely turf impenetrable to roots of seedlings. The only undergrowth consists of small quantities of asari and kharani.

Name of beat or compartment.	Description.
	Crop.—The lower portion, about 23 acres, is blank, with bamboos and other foul growth. Crop irregular, large poles and trees of all species, but principally kawala. Phalat and búk are few, maples not plentiful. Chindia, lopped by graziers, is common. Canopy incomplete and blanks numerous, in patches of half an acre containing nothing but turf and bamboos. Most large trees are hollow, in consequence of shallow soil, and these consist chiefly of chestnut, oak and champ. No young growth or seedlings of these trees exist. The young growth chiefly of kharani with kawala. The compartment is cut up by cattle paths. Besides the grazing bathan, near the top of this compartment, there is evidently illicit grazing from the bathans outside, below the lower boundary, • This compartment has suffered greatly and requires long rest from cattle and all fellings. It and No. 4 will take a full rotation to recover.
Balasan, 6	Aspect south. Slope steep. *Area.*—91 acres. *Soil.*—Shallow, hard, often exposed. *Crop.*—A blank at bottom of about 25 acres, containing turf and a few bramble bushes only. Crop consists of fair forest of trees and large poles oak, chestnut, kawala and paielli, few small poles and saplings, no seedlings. Crop generally incomplete, but in places almost complete; numerous glades, principally in the streams, containing thick impenetrable turf, scrub bamboo and asari. There is a good deal of undergrowth of scrub bamboo and asari, and in this respect this compartment differs from Nos. 1, 2, 3, 4. Near top a lot of over-mature trees are scattered over bamboo scrub. Grazing and lopping have not so seriously damaged this as the previous compartments.
Balasan, 7	Aspect south. Slope steep *Area* —171 acres. *Soil.*—Shallow, loose and sliding in consequence of over grazing and treading of cattle. No seedlings. *Crop.*—Includes about 70 acres at the bottom of the compartment, consisting of turf and bramble jungle, with occasional patches of kharani and jhingni sometimes nearly constituting thicket. In remainder of compartment the forest crop contains trees of all stages, well distributed, but the forest is thin, does not form canopy, large timber trees scarce, glades in places especially in upper portion. Much overgrazed. Soil loose and sliding in consequence, and absence of seedlings. Here again is a bathan just outside the forest boundary, the source of continual damage.
Balasan beat.—General summary of description of compartments.	Aspect south. Slope steep. *Soil.*—Shallow, poor, in consequence of exposure and the treading of cattle often consists of turf impenetrable to roots of seedlings. *Crop.*—The lower part of every compartment except No. 1 is bare, or consists of brambles with patches of thicket, bushes of kharani, &c. The forest consists of trees of all stages, but the younger stages are sparsely represented and unevenly distributed. The state of canopy rarely exists and usually the forest is thin. The beat has suffered much from grazing and the lopping of the graziers, both from graziers inside the forest and from those outside.
Palongdong, 1 ...	Aspect south. Slope rather steep. *Area.*—117 acres. *Soil.*—Shallow, clay sub-soil exposed, cut up by cattle paths. *Crop.*—The lower portion, containing about 75 acres, consists of turf with bramble jungle and occasional patches of thin forest, of thicket bushes, of kharani and jhingni, and on steep positions a few trees. The upper portion consists of forest fairly complete but with numerous patches of thin forest and blanks. Trees and poles well distributed, but no young growth, either as saplings, thicket-bushes or seedlings. Oak and chestnut well represented among the old trees. General condition of forest unsatisfactory, grazing the cause.
Palongdong, 2 ...	Aspect south, slope gentle and rather steep. *Area.*—211 acres. *Soil.*—Shallow and too stiff to allow of germination of seed, but in the upper part fair in comparison with the soil of the compartments more heavily grazed Thin covering of dead leaves and thin surface vegetation. *Crop.*—Large blank at bottom containing about 46 acres. Below this glade, just outside the boundary, are two grazing bathans which render the reclaim of this piece impossible under the present conditions. Of these 46 acres, about two-thirds are perfectly bare, with turf soil, and one-third consists of scrub of bramble and thicket bushes of kharani, &c., with scattered saplings of malota. In the remainder of the compartment the crop is generally complete, forming light canopy. Trees of all stages, except seedlings, represented, and well mixed. Younger stages, such as saplings and thicket-bushes, insufficiently so. Seedlings wanting. General condition of crop comparatively good. In the upper part is a grazing bathan, and in its vicinity the forest has much suffered.

Name of beat or compartment.	Description.
Palongdong 3	Aspect—South-east. Slope gentle and rather steep. *Area.*— 330 acres. *Soil.*—Shallow, boulders protrude, generally the clay sub-soil is exposed, in places 3 to 4 inches depth of black soil, with scattered bamboos and ferns as surface vegetation. In the neighbourhood of the bathans the soil consists of turf without any cover of forest. *Crop.*—This area includes an area of about 81 acres in the lower part, which is blank, and consists of turf only with a few patches of malota in the streams and steep places. In the remainder of the compartment crop very irregular and incomplete. Paielli, kawala, kharani with dudila and chindia are most common. All stages fairly represented except seedlings, and when these do occur they are mostly kharani and jhingni. Saplings of oak and chestnut occur. Among large trees oak and chestnut fairly plentiful, but often unsound. In vicinity of bathans the crop is thin and saplings are absent. In the more immediate neighbourhood of the bathans, all forest growth is absent and the soil is mere turf. The whole area is cut up by cattle tracks, and grazing is the cause of the blanks and bad state of soil and absence of seedlings.
Palongdong 4	Aspect—South and south-west. Slope steep. *Area.*—191 acres. *Soil.*—As in compartment 3. *Crop.*—This compartment is under forest down to its lower boundary. The forest growth resembles that of compartment 3 described above, but grazing has been less heavy.
Permaigiri 3	Aspect—Northern. Slope rather steep. *Area.*—202 acres. *Soil.*—Deep, loose, good quantity of humus and decaying leaves; undergrowth of bamboos in patches. *Crop.*—In the lower part is a blank of about 27 acres. Crop irregular, all stages represented and mixed from big trees and saplings to thicket bushes; big trees not numerous. Small poles and saplings predominate. Canopy generally complete; few blanks. Seedlings of one and two years old rare except in case of kharani, arupati and kanukpa. A few seedlings of maple and oak found. There has been comparatively little grazing, and as further evidence of this few of the "lali" trees have been lopped. The condition of this compartment is far superior to that of any in Balasan and Palongdong.
Permaigiri 2	Aspect—Northern. Slope rather steep. *Area.*—180 acres. *Soil.*—Fairly good, plentiful covering of dead leaves, but not sufficiently protected to ensure decomposition. Nearly free from surface vegetation. Bamboos in patches. *Crop.*—A blank of about 14 acres at bottom. Crop irregular, not complete, all stages represented, large poles predominating, saplings numerous, as also large trees. Canopy not formed, though the crop approaches to completeness. Seedlings of one and two years old absent. The compartment is grazed. Cattle paths over all the compartment. Curiously the lali saplings have scarcely been lopped, as in the forests on the south side of the range.
Permaigiri 1 ...	Aspect—North, slope steep. *Area.*—127 acres. *Soil.*—Fairly good, a plentiful surface vegetation of brambles, but not dense. *Crop.*—Generally complete, all stages. Saplings largely predominate. Seedlings of a few years old in stage of thicket bushes numerous. Generally the crop is young for the position of the compartment in the working circle. Natural reproduction is fair; small poles of lali are numerous and they have not been much lopped. There is no blank at the bottom of this compartment.
Chongtong Beat ...	Aspect—North. *Area.*—881 acres. *Soil.*—Shallow, poor. *Crop.*—The lower parts of compartments 5, 4, 3, had been cleared of large forest, and now contain a growth of young jhingni almost forming thicket; the crop is less thick in the western than in the eastern portion of the beat. In the western portion, compartments 8, 6 and 5, the crop is incomplete, formed of trees of all stages, but small poles and saplings are scarce. The trees are of poor growth, poor tops, probably due to shallow soil. Undergrowth of kibu and asari, with bamboos in the upper portions. In the eastern portion, compartments, 1 to 4, the crop is fairly complete, forming light canopy; all stages exist, large poles predominating. The species are principally maple, kawala, champ and oaks. In places near the Lepchajagat Tumsong road, gaps have been caused by felling odd trees for timber, and a young growth of kharani and jhingni is quickly filling them up. There is grazing in the beat, but not heavy grazing. Near the ridge the growth is poor and there are many isolated stunted old trees, some of which were killed by fire in, it is believed, 1867.

Name of beat or compartment.	Description.
	In this beat an area containing numerous champ seedlings was observed in 1883 and was fenced in. It now contains a crop of seedlings that may be called complete, that is sufficiently numerous to form of themselves alone a complete thicket in a few years time. These consist of champ, maple, jhingni, kharani and a few oaks, the first two being more especially plentiful. The result is satisfactory as showing what protection from grazing will do in these forests. The tree tops sheltering this area are generally just isolated.
Rishihat Beat ...	Aspect—North. Slope generally steep. *Area*—666 acres. *Soil.*—Poor and very poor, except in lower part compartment 2, where it is good. When poor it is rocky. *Crop.*—Lower part of compartments 2, 3, about 58 acres, contains young thicket of jhingni overtopped by malota saplings, without large tree forest. Crop generally complete; trees of all stages; small and large poles predominate, except at bottom of compartment 2, where small poles and saplings predominate. Undergrowth of kibu abounds in parts of the beat; seedlings of champ and maple are numerous and oak seedlings are found, more especially when the soil is good and the cover of the trees is elevated and the ground is free from weeds. The lali is not lopped here. These are the places which the rocks and boulders have rendered unsuitable to grazing.
Nai Beat ...	Aspect—North, slope steep and very steep. Part of beat has a southern aspect. *Area.*—1,125 acres. *Soil.*—In upper parts good, in lower poor, better in eastern parts. *Crop.*—The lower parts of compartments 2 and 3 below a level of 6,000 feet, consist, over an area of about 160 acres, of cane-brake and scrub growth, the latter overtopped by malota saplings appearing on the 1—2 spur. The cane principally in compartment 3. In compartment 1 the tree forest extends to the lower boundary. The forest consists of a crop generally complete of all stages, small poles and saplings predominating, large trees not plentiful, but more so towards the eastern parts. The crop is incomplete near the streams. Reproduction good, thicket bushes and saplings of jhingui, kharani, maples, oaks, and chestnuts are numerous, the first two being very plentiful. Seedlings of one and two years old exist and would doubtless be plentiful if not for grazing. The large number of thicket bushes is characteristic of this beat. This is not a favourite grazing-ground, being steep. Near the ridge kharani forms a complete sub-stage of itself, forming canopy as thicket and saplings. In the portions on south side of ridge, bamboo to a great extent takes the place of the kharani thicket.
Goom 3 ...	Aspect – East, slope steep. *Area.*—174 acres. *Soil.*—Shallow, clay often exposed. *Crop.*—Incomplete, consisting of large poles and trees principally, and in places a good growth of kharani thicket coming up.
Goom 1, 2 ...	Aspect.—North-west. Slope rather steep and steep. *Area.*—326 acres. *Soil.*—As in compartment 3, turf in places. *Crop.*—The whole surface was recently clean felled and was heavily grazed till 1883, when it was closed. The ground is fast covering itself with a growth of bamboos, wormwood, &c., amongst which there are sufficient kharani and other inferior trees to form a forest in the future. Bamboos were planted here in 1883 and 1884.
Pachim ...	Aspect—West. Slope steep and very steep. *Area.*—468 acres. *Soil.*—Good, moist and fairly deep. *Crop.*—Resembles Sonada. A thick sapling forest, forming nearly complete canopy with a few poles and trees.
Rinchingtong Dhara S. and N.	Aspect—West and south respectively, slope steep. *Area.*—38 and 17 acres respectively. *Soil.*—Poor, shallow, clay often exposed, bare of surface vegetation. *Crop.*—Old high timber, forest thin, not forming canopy; young growth absent; requires protection from grazing.
Sonada ...	Aspect—West. Slope steep. *Area.*—592 acres. *Soil.*—Good, moist, fairly deep, except in portion near cart road, where heavy grazing has been allowed. *Crop.*—Generally a thick growth of small saplings, forming complete canopy, with poles and trees standing over them at intervals. These trees are more numerous in places, for instance towards the northern end of the beat, and below the old military road. In the north part of the beat and near the cart road the crop of saplings is not complete. General condition good. Crop too young to open to grazing.

Name of beat or compartment.	Description.
Dooteria	Aspect—West, slope gentle. *Area*—574 acres. *Soil.*—Shallow from long exposure, only just forming. *Crop.*—A collection of thicket bushes (seedlings) and coppice-shoots approaching the state of thicket; jhingni, kawala, asari, arupati, maple and kharani. The forest was clean-felled about 10 years ago, and it took several years for a growth of bramble, wormwood, and the above species to cover the soil. In lines cut through this jungle, plants of champ, oak, pipli, &c., were put out and are succeeding sufficiently well to ensure a due proportion of the better species. In consequence of the clean felling the growth is backward, and it will be years before this beat can support grazing.
Rangbul	*Aspect.*—S.-W. Slope steep. *Area.*—521 acres. *Soil.*—Shallow from exposure; is reforming rapidly. *Crop.*—Resembles that of Dooteria, but is more advanced. This forest was clean-felled after a destructive fire. The natural growth has attained the stage of thicket, and generally forms a complete crop. The plants introduced artificially have not generally survived, but notwithstanding the composition of the crop is fair. A few parts (plantation Nos. 9 and 7) are still young plantations and are doing well. In the eastern parts the old forest remains, and consists of trees, small and large, and saplings; in places thicket bushes replace the saplings. Poles large and small, not plentiful.
Tungsong Poobong ...	Aspect—South, slope rather steep and steep. *Area.*—1,075 acres. *Soil.*—Very bad. Subsoil of clay often exposed, little humus, the result of grazing. A few blanks, aggregating what 50 acres, in compartments 3, 6. 7. Crop very irregular. The forest has been worked for fuel. In the eastern part of the beat the crop was clean felled and the area planted. In the western parts the crop was thinned and, cattle being excluded, young growth came up. This thinning left a few seed bearers and all small poles and saplings not destroyed by the felling operations. The distribution of thicket is, however, not continuous. In places poles and occasional large trees are standing, in others poles only. The advance growth consists generally of thicket bushes and saplings of kharani generally fairly complete; it is filled in with thick growth of bamboo. As grazing was stopped here in 1883 only, the state of reproduction is satisfactory. These compartments will be ready for a final felling, which will remove the trees, in 5 to 10 years time. It will not be necessary to plant the better species. In the central compartments the seed-bearers are more numerous and there is a fair number of natural seedlings of oak and chestnut. The advance growth is good. In compartment 2, which was clean felled, large blanks were planted up between 1879 and 1883. The plants, especially those of champ, are doing well.
Rungirum	Aspect—North and north-west. Slope gentle and rather steep. Spurs broad. *Area.*—388 acres. *Soil.*—Fairly deep, moist, sub-soil nowhere exposed, deepish covering of black soil. *Crop.*—*Compartments* 1-2.—Whole area under forest. Crop irregular. Canopy generally complete. Large trees, small trees, and poles, the last predominating. All classes well represented. Saplings and seedlings very well represented. One of the best bits of forest in the working circles. Among large trees the oaks are numerous and champ sufficient. In younger growth kharani predominates largely. Among the seedlings up to three and four years old, champ is sufficiently represented, with pailli and Lepcha phal. Oaks are nearly absent. Whole area covered with vegetation of kibu, which is thin only under low thick cover. The good condition of the crop is ascribed to protection from grazing and graziers. *Compartment* 3.—Similar to above. Saplings, however, more numerous, principally kharani and these, often of themselves forming canopy under the older forest, which itself seldom forms canopy. *Compartments* 4 *to* 5. Similar to No. 3, but the older forest being denser, the sapling crop is thinner. Ready to form thick forest on removal of the old crop.
Dawaipani, compartments 4, 5, 6.	Aspect—Northern, slope from steep to precipitous. *Area.*—491 acres. *Soil.*—Fair, loose and moist, but liable to slide. *Crop.*—This area was some years back cleared by cultivators, now covered with forest growth of wormwood, long grass and brambles. Large trees entirely absent. Tree growth consists of stool shoots of trees, such as gogen utis (alder), kanukpa (evodia fraxinifolia) and malota (malotus albus). In upper portion of Nos. 4 and 5 a flourishing plantation of about 10 years old of pipli at state of thicket nearly pure, and a small plantation of walnut. Generally the tree-growth is sufficient to ensure re-establishment of forest without planting, grazing being of course entirely excluded.

Name of beat or compartment.	Description.
Dawaipani, compartment 1.	Aspect—Northern, slope gentle and steep. *Area.*—84 acres. *Soil.*—Good. Black soil fairly deep, covered with dead leaves, and thick undergrowth of kibu. *Crop.*—Generally complete, thin at intervals, poles predominating, large trees unevenly distributed. Seedlings of paielli, champ, kharani and jhingni plentiful. Few oak.
Compartments 2, 3 ...	Aspect and slope as No. 1. *Area.*—310 acres. *Soil.*—As in No. 1, but more cut up by streams, liable to slip. Upper portions covered with thick growth of kibu; lower portions with foul growth of bramble and cane almost impenetrable. Rocks frequently exposed. *Crop.*—Upper portions fairly regular forest. Upper stage of trees often overmature, not forming canopy; lower stage complete thicket consisting principally of kharani. Notwithstanding the thick growth of kibu, natural reproduction good. The lower portion was apparently formerly the site of a village.
Rungjo, compartment 1	Aspect—South-east, slope gentle. *Area.*—148 acres. *Soil.*—Shallow, mediocre, dry, rocks frequently crop up. Upper portions covered with kibu; lower portions with turf, ferns, brambles and cane. The last mostly in the numerous streams. *Crop.*—Lower portions of compartments bare; the rest high forest of trees; canopy much interrupted. Large poles often take the place of the trees. Undergrowth insufficient. Besides the lower portions, which are blank, there are blanks near the grazing bathans. Much damage done by grazing from cattle and graziers living inside and outside the forest.
Rungjo 2 ...	Aspect and slope—As in compartment 1. *Area.*—216 acres. *Soil.*—Poor and dry, liable to landslips, upper portion covered with surface vegetation of kibu, lower portions with brambles and cane. *Crop.*—Excluding an area of about 30 acres at the lower part of this compartment, consisting of grass and scrub, the forest is an irregular one of trees and large poles, canopy complete in upper portion, crop open in lower, undergrowth absent except in upper part.
Rungjo 3 ...	Aspect—South, slope steep and very steep. *Area.*—113 acres. *Soil.*—Shallow, dry, rock protruding, surface soil exposed; the blank at bottom of compartment turf and scrub. *Crop.*—Irregular, trees and large poles, undergrowth scarce, large open spaces round the grazing bathans.
Rungjo 4, 5, 6, 7 ...	Aspect and slope as above. *Area.*—693 acres. *Soil.*—Large portion covered with turf, or brambles and cane. *Crop.*—Many blanks, trees and poles, canopy open with little undergrowth, seriously damaged by grazing.
Senchal ...	Aspect—North-west, slope steep. *Area.*—140 acres. *Soil.*—Good in lower portion and rocky in upper portion. *Crop.*—As in northern part of Tiger Hill. (See below.)
Tiger Hill ...	Aspect—East and north, slope rather steep. *Area.*—689 acres. *Soil.*—Shallow, subsoil of clay often exposed. *Crop.*—Very irregular, but all stages combine to form a complete canopy over the soil. Small trees and large poles predominate in the upper stages; young saplings exceptionally plentiful, forming a nearly complete crop of themselves. Large gaps in upper stages, fast closing up with saplings of kharani, maple, and a few oaks, lali, and champ; many large trees have been extracted for timber. No seedlings found. In the northern portion of the beat the advance growth is less thick, the reproduction less advanced, but good. Considerable damage done by felling trees for timber. Grazing not heavy. In the higher portion the saplings are less numerous and are badly shaped, and rhododendrun occurs among the poles. The crop is fairly complete, but damaged by snow-storms. On the ridge the crop is stunted bamboo.
Rangbi ...	Aspect—Eastern, slope generally steep. *Area.*—1,220 acres. *Soil.*—Shallow and very shallow; the clay sub-soil often exposed; thin covering of dead leaves; surface vegetation of ferns and kibu. *Crop.*—All stages well represented and mixed. Canopy generally complete. The large and small trees and poles often themselves form canopy. Small saplings numerous in parts, in others thicket bushes take their place and form a nearly complete crop. General condition of crop decidedly good; comparatively little damage done by cattle. In higher portion the crop resembles the higher part of Tiger Hill.

Name of beat or compartment.	Description.
Rishap ...	Aspect—Northern, slope rather steep. *Area.*—1,196 acres. *Soil.*—Deep, rich layer of mould. Thick vegetation of kibu up to about 7,000 altitude, when maling bamboos take its place. *Crop.*—Irregular, consisting principally of over-mature trees and small poles, saplings, thicket bushes, and seedlings not plentiful. Seedlings occur in places, generally on highest parts near the ridge.
Sureil ...	Aspect—Southern, slope gentle to precipitous. *Area.*—1,087 acres. *Soil.*—Fairly good, but rock often protrudes. In upper portions undergrowth of maling bamboo; in lower portions thick growth of brambles and cane. *Crop*—Irregular, consisting principally of over-mature trees and of poles. Canopy incomplete. Seedlings of good species very rare.
Mamrim ...	Aspect—North-east, slope gentle to steep. *Area.*—1,183 acres. *Soil.*—Mediocre. *Crop.*—In lower portions the forest is bare of trees, nothing but scrub of jamun, mowa, kharani, and a few malotas and chestnut saplings. In upper portions irregular crop, with nearly complete conopy, containing fine trees of oak, chestnut and kawala. Saplings of the two former species occur.
Chattakpur ...	Aspect—West, slope rather steep and steep. *Area.*—911 acres. *Soil.*—Fairly good, moist, well covered with forest. *Crop.*—Generally complete; saplings and small poles largely predominate, and of themselves form a complete canopy. Trees not numerous standing over them.
Rangnu ...	Aspect—North, slope steep and precipitous. *Area.*—534 acres. *Soil.*—Poor, shallow, due to exposure, but gradually forming. *Crop*—The growth is scrub, except in the upper portions of the beat; consists of wormwood, grass, brambles, cane, &c. The upper portion contained tree forest, which has been worked for fuel partly in clean-fellings and partly by a heavy thinning, leaving saplings and small poles and a few trees standing. The portion clean-felled was further damaged by grazing going on at the time of the fellings. It was planted in 1880-1882. This part is now covering itself with young forest of kharani, maple, kawala, &c., assisted in places by the transplants, and its future is ensured. The lower part, formerly cleared for cultivation, has sufficient growth to ensure a fair naturally-grown forest with protection. Part of this lower portion was also planted artificially in 1878 and 1879.

CHAPTER III.

WORKING PLAN.

(1)—*Regulation of fellings.*

29. The forests are divided into two working circles, as below. The general prescriptions apply to both circles, the detailed operations for each circle being laid down in its own table—

Working circles.

Western circle	...	...	...	8,854 acres.
Eastern circle	...	...	...	9,169 „
		Total	...	18,023

30. The principal demand on these forests being for fuel, it is necessary that the Working Plan be arranged so as to obtain the greatest quantity of material. The rotation prescribed is 108 years. No data are available from which to calculate the length of the rotation corresponding with a yield of the greatest quantity, but the growth of the trees being slow, it is probable that 108 years will not be found too long.

Method of treatment.

At the same time the unfortunate necessity for allowing grazing over nearly half the area would prevent the adoption of a shorter rotation, it being

considered necessary to close each portion of the forest against grazing for a term of at least fifty or sixty years before again re-opening it.

The above considerations have also led to the adoption of the method of treatment here prescribed, which is a modification of the method of natural regeneration assisted by planting and sowing.

31. Did any doubt exist as to the practicability of trusting to natural regeneration if grazing be excluded, an inspection of the whole forest and a comparison, for instance, of the Poobong and Rishihat beats with the Balasan beat in their present state would dispel it.

In those portions of the forest which have arrived at maturity, provided that they have been protected against grazing and heavy fellings, in other words, provided the soil has been properly protected, there is almost always, at all aspects, a plentiful crop of seedlings, usually in the state of thicket-bushes and saplings. This growth is generally sufficiently plentiful to constitute after a few years a complete "*thicket*" entirely covering and protecting the soil.

This young growth, which is here referred to as "advance-growth," in most cases exists before the old stock is thinned out; when it does not, it springs up soon after the thinning of this old crop described below. It does not spring up readily after a clean-felling.

This growth consists principally of trees of the inferior species, such as kharani, jhingni, &c., but these on the gradual removal of the old stock are supplemented by kabashi, kawala and others.

The natural reproduction in the better species is sufficiently good; for instance, seedlings of champ are plentiful in these protected forests, and those of oak are often met with.

The demand being for fuel in the largest quantities procurable, an advance growth of the above nature, even without the better species, such as champs and oaks, is sufficient, but where these better species are not represented in sufficient proportion, this defect will be remedied by their introduction by artificial means.

Principal fellings.

32. For the above reasons and in order to simplify the Working Plan, the standing crop on any given area will be removed in two fellings. The former of these fellings will consist of a thinning in the old forest which will remove less than half the old crop, leaving standing the remainder together with all advance-growth.

The second felling, which will be executed after a fixed interval of years, will remove nearly the whole of the remaining half of the old stock, leaving the advance-growth, and such few trees as will be prescribed in the sylvicultural portion of this Working Plan. The necessity for limiting this interval is a natural out-come of the rotation of grazing areas.

These two fellings will be referred to in the plan as the first and second fellings respectively.

Selection of the capability.

33. It had been intended to fix the annual capability of the forest for a number of years, and to work the compartments in the order prescribed, by regeneration fellings, the crop being thinned to the extent dictated by sylvicultural considerations, and over the area necessary to yield the quantity fixed by this capability, applying a volume capability with an area check; the check area being of considerable extent, $\frac{1}{4}$th or $\frac{1}{5}$th of the working circle, in fact being a "periodic block."

The desirability of preparing a simpler plan has, however, led to the adoption of a volume capability with an area check,* this area being a much smaller fraction ($\frac{1}{18}$th) of the working circle.

Working tables.

34. The following tables give for each of the working circles the order of the principal fellings.

The term "principal fellings" is that applied to the two regeneration fellings above described, and termed "first felling" and "second felling."

Groups or check areas.

35. The beats forming these circles are in each case subdivided into compartments.

* In the opinion of the officer preparing this plan (an opinion which is shared by his Conservator) there are weighty objections to this system, which, he respectfully submits, subordinates sylvicultural considerations to a desire for simplicity in management, but the Inspector-General has over-ruled them.

WORKING TABLE.

Western Working Circle.

Area 8,854 *Acres*—108 *years.*

Name of Beat.	Compartment. Number.	Area. Well stocked.	Area. Poorly stocked.	Area. Total.	Group or "check-area."	Designation of group.	Period of "first" fellings.	Period of "second" fellings.	Year of cleaning.	Year of thinnings.			Year of opening to grazing.	Year of jardinage fellings.		Year of return of principal fellings.
Balasan	6	66	25	91			1888-89	1897-98								
Do.	7	101	70	171	590	A	1889-90	1898-99	1903-4	1909-10	1918-19	1927-28	1930-31	1950-51	1973-74	1996-97
Palongdong	1	42	75	117			1890-91	1899-1900								
Do. ...	2	165	46	211												
Do.	3	249	81	330			1891-92	1900-1								
Do.	4	191	.....	191	521	B	1892-93	1901-2	1906-7	1912-13	1921-22	1930-31	1933-34	1953-54	1976-77	1999-200
							1893-94	1902-3								
Permaigiri	3	175	27	202			1894-95	1903-4								
Do.	2	166	14	180	509	C	1895-96	1904-5	1909-10	1915-16	1924-25	1933-34	1936-37	1956-57	1979-80	2002-3
Do.	1	127	.....	127			1896-97	1905-6								
Uhongtong	5	147	13	160												
Do.	4	78	47	125			1906-7	1915-16								
Do.	3	109	49	158	531	D	1907-8	1916-17	1921-22	1927-28	1936-37	1945-46	1948-49	1968-69	1991-92	2014-15
Do.	2	88	.....	88			1908-9	1917-18								
Do.	1	275	.....	275			1909-10	1918-19								
Do.	6	44	31	75	470	E	1910-11	1919-20	1924-25	1930-31	1939-40	1948-49	1951-52	1971-72	1994-95	2017-18
Bishihat	3	107	13	120			1911-12	1920-21								
Do.	2	204	45	249			1912-13	1921-22								
Do.	1	297	.....	297	546	F	1913-14	1922-23	1927-28	1933-34	1942-43	1951-52	1954-55	1974-75	1997-98	2020-21
							1914-15	1923-24								
Nai	3	115	70	185			1924-25	1933-34								
Do.	2	175	90	265	617	G	1925-26	1934-35	1939-40	1945-46	1954-55	1963-64	1966-67	1986-87	1901-2	2032-33
Do.	1	167	.....	167			1926-27	1935-36								
							1927-28	1936-37								
Do.	5	219	.....	219			1928-29	1937-38								
Do.	4	289	.....	289	508	H	1929-30	1938-39	1942-43	1948-49	1957-58	1966-67	1969-70	1989-90	1904-5	2035-36
							1930-31	1939-40								
Goom	3	174	.....	174			1931-32	1940-41								
Chattakpur	1	234	.....	234	408	I	1932-33	1941-42	1945-46	1951-52	1960-61	1969-70	1972-73	1992-93	1907-8	2038-39
							1942-43	1951-52								
Pashim	3	118	.....	118			1943-44	1952-53								
Do.	2	93	.....	93	468	J	1944-45	1953-54	1957-58	1963-64	1972-73	1981-82	1984-85	1896-97	1919-20	2050-51
Do.	1	257	.....	257												
Rinchintongdhara south.	.....	38	.....	38												
							1945-46	1954-55								
Rinchintongdhara north.	.....	17	.....	17	309	K	1946-47	1955-56	1960-61	1966-67	1975-76	1984-85	1987-88	1899-1900	1922-23	2053-54
							1947-48	1956-57								
Sonada	2	141	.....	141												
Do.	2	203	.....	203												
							1948-49	1957-58								
Do.	1	248	.....	248			1949-50	1958-59								
Bungbul	4	215	.....	215	463	L	1950-51	1959-60	1963-64	1969-70	1978-79	1987-88	1990-91	1902-3	1925-26	2056-57
Do.	3	142	.....	142												
Do.	2	104	.....	104			1960-61	1969-70								
Do.	1	60	.....	60	407	M	1961-62	1970-71	1975-76	1981-82	1990-91	1891-92	1906-7*	1914-15	1937-38	2068-69
Dooteria	2 (upper)	101	.....	101			1962-63	1971-72								
Do.	2 (lower)	241	...	241			1963-64	1972-73								
Do.	3	159	.....	159	473	N	1964-65	1973-74	1978-79	1984-85	1993-94	1894-95	1915-16*	1917-18	1940-41	2071-72
Do.	1	73	.....	73			1965-66	1974-75								
Tungsong Poobong ...	1	50	.....	50			1966-67	1975-76								
Do. do. ...	2	132	.....	132			1967-68	1976-77								
Do. do. ...	3	183	.....	183	445	O	1968-69	1977-78	1981-82	1987-88	1888-89	1897-98	1912-13*	1920-21	1943-44	2074-75
Do. do. ...	4	80	.....	80												
Do. do. ...	5	118	.....	118			1978-79	1987-88								
Do. do. ...	6	164	.....	164	409	P	1979-80	1988-89	1993-94	1891-92	1900-1	1909-10	1912-13	1932-33	1955-56	2086-87
Do. do. ...	7	127	.....	127			1980-81	1989-90								
Do. do. ...	8	221	.....	221			1981-82	1990-91								
Goom	1	158	.....	158	547	Q	1982-83	1991-92	1888-89	1894-95	1903-4	1912-13	1915-16	1935-36	1958-59	2089-90
Do.	2	168	.....	168			1983-84	1992-93								
Balasan	1	187	.....	187												
Do.	2	117	11	128			1984-85	1993-94								
Do.	3	39	23	62	543	R	1985-86	1994-95	1891-92	1897-98	1906-7	1915-16	1918-19	1938-39	1961-62	2092-93
Do.	4	71	20	91			1986-87	1995-96								
Do.	5	52	23	75												
	.....	.....	.....	8,854												

With reference to the data given in this table for the execution of cleanings and thinnings, these operations will be commenced in the year prescribed in this table. If they cannot be completed in one year, they may extend over the three years of the period commencing with the above year, in which case the compartments will be worked in the order given in this table, at least one-third of the group in the first year, at least half the balance in the second year, and the remainder in the third year.

In the case of the jardinage fellings the whole of the prescribed area should be worked over in one year, the year prescribed in the table.

* Exceptional cases.

WORKING TABLE.

Eastern Working Circle.

Area 9,169 *acres*—108 *years*.

Name of Beat.	Compartment. No.	Area. Well stocked.	Area. Poorly stocked.	Area. Total.	Group, or "check area."	Designation of group.	Period of "first" fellings.	Period of "second" fellings.	Year of cleaning.	Year of thinnings.			Year of opening to grazing.	Year of jardinage fellings.		Year of return of principal fellings.
Rangirum	4	91	.....	91	383	A	1888-89	1897-98	1903-4	1909-10	1918-19	1927-28	1930-31	1950-51	1973-74	1996-97
Ditto	5	35	.....	35			1889-90	1898-99								
Ditto	1	69	.....	69			1890-91	1899-1900								
Ditto	2	104	.....	104												
Dawalpani	1	84	.....	84												
Ditto	3	142	.....	142	458	B	1891-92	1900-1	1906-7	1912-13	1921-22	1930-31	1933-34	1953-54	1976-77	1999-2000
Ditto	3	168	.....	168			1892-93	1901-2								
Rungjo	1	118	30	148			1893-94	1902-3								
Do.	2	186	30	216	423	C	1894-95	1903-4	1909-10	1915-16	1924-25	1933-34	1936-37	1956-57	1979-80	2002-3
Do.	3	83	30	113			1895-96	1904-5								
Do.	4	74	20	94			1896-97	1905-6								
Do.	5	262	.....	262	599	D	1906-7	1915-16	1921-22	1927-28	1936-37	1945-46	1948-49	1968-69	1991-92	2014-15
Do.	6	230	.....	230			1907-8	1916-17								
Do.	7	107	.....	107			1908-9	1917-18								
Senchal	.....	140	.....	140	495	E	1909-10	1918-19	1924-25	1930-31	1939-40	1948-49	1951-52	1971-72	1994-95	2017-18
Tiger Hill	1	109	.....	109			1910-11	1919-20								
Ditto	3	236	.....	236			1911-12	1920-21								
Ditto	3	269	.....	269	405	F	1912-13	1921-22	1927-28	1933-34	1942-43	1951-52	1954-55	1974-75	1997-98	2020-21
Ditto	4	75	.....	75			1913-14	1922-23								
Rangbi	1	151	.....	151			1914-15	1923-24								
Ditto	2	148	.....	148	539	G	1924-25	1933-34	1939-40	1945-46	1954-55	1963-64	1966-67	1986-87	1901-2	2032-33
Ditto	3	35	.....	35			1925-26	1933-34								
Ditto	4	75	.....	75			1926-27	1935-36								
Ditto	5	281	.....	281												
Ditto	6	422	.....	422	422	H	1927-28	1936-37	1942-43	1948-49	1957-58	1966-67	1969-70	1989-90	1904-5	2035-36
							1928-29	1937-38								
							1929-30	1938-39								
Ditto	7	108	.....	108	479	I	1930-31	1939-40	1945-46	1951-52	1960-61	1969-70	1972-73	1992-93	1907-8	2038-39
							1931-32	1940-41								
Rishap	1	371	.....	371			1932-33	1941-42								
Do.	2	337	.....	337	337	J	1942-43	1951-52	1957-58	1963-64	1972-73	1981-82	1984-85	1896-97	1919-20	2050-51
							1943-44	1952-53								
							1944-45	1953-54								
Do.	3	210	.....	210	690	K	1945-46	1954-55	1960-61	1966-67	1975-76	1984-85	1987-88	1899-1900	1922-23	2053-54
Do.	4	132	.....	132			1946-47	1955-56								
Do.	5	146	.....	146			1947-48	1956-57								
Sureil	1	.....	.....	202												
Do.	2	.....	.....	105	570	L	1948-49	1957-58	1963-64	1969-70	1978-79	1987-88	1990-91	1902-3	1925-26	2056-57
Do.	3	.....	.....	229			1949-50	1958-59								
Do.	4	.....	.....	176			1950-51	1959-60								
Do.	5	315	.....	315	768	M	1960-61	1969-70	1975-76	1981-82	1990-91	1891-92	1894-95	1914-15	1937-38	2068-69
Mamrim	1	188	.....	188			1961-62	1970-71								
Do.	2	265	.....	265			1962-63	1971-72								
Do.	3	445	.....	445	730	N	1963-64	1972-73	1978-79	1984-85	1493-94	1894-95	1897-98	1917-18	1940-41	2071-72
Do.	4	285	.....	285			1964-65	1973-74								
							1965-66	1974-75								
Chattakpur	5	199	.....	199	454	O	1966-67	1975-76	1981-82	1987-88	1888-89	1897-98	1900-1	1920-21	1943-44	2074-75
Ditto	4 (lower)	104	.....	104			1967-68	1976-77								
Ditto	3 (lower)	151	.....	151			1968-69	1977-78								
Ditto	4 (higher)	35	.....	35	454	P	1978-79	1987-88	1993-94	1891-92	1900-1	1909-10	1912-13	1932-33	1955-56	2086-87
Ditto	3 (higher)	50	.....	50			1979-80	1988-89								
Ditto	2	138	.....	138			1980-81	1989-90								
Rangnu	1	.....	.....	231												
Do.	2	.....	.....	174	522	Q	1981-82	1990-91	1888-89	1894-95	1903-04	1912-13	1915-16	1935-36	1958-59	2089-90
Do.	3	129	.....	129			1982-83	1991-92								
Dawalpani	4	.....	.....	219			1983-84	1592-93								
Ditto	5	.....	.....	167	361	R	1984-85	1993-94	1891-92	1897-98	1906-7	1915-16	1918-19	1938-39	1961-62	2092-93
Ditto	6	.....	.....	105			1985-86	1994-95								
Rungirum	3	.....	.....	89			1986-87	1995-96								
				9,169												

With reference to the dates given in this table for the execution of cleanings and thinnings, these operations will be commenced in the year prescribed in this table. If they cannot be completed in one year, they may extend over the three years of the period commencing with the above year; in which case the compartments will be worked in the order given in this table, at least one-third of the group in the first year, at least half the balance in the second year, and the remainder in the third year.

In the case of the jardinage fellings, the whole of the prescribed area should be worked over in one year, the year prescribed in the table.

The table shows how these compartments have been arranged in groups termed "check areas." These "check areas" differ in size, and in forming them their relative capability has been considered as far as practicable.

The rotation of 108 years is divided into periods of three years each.

The period of three years is the time prescribed for either one of the two principal fellings (the "first" felling or the "second" felling, not both) to pass over the group of compartments allotted to it.

This group of compartments forms a "check area" in the following manner, its object being to constitute an absolute obstacle to continued over-cutting :—

Each "group" or "check area" will thus in its turn be worked over by a "first" felling in a given period, and after a prescribed interval will be again

worked over by a "second" felling, and the 18 groups will be regenerated in twice this number of periods, that is, in 36 periods, or 108 years.

Application of the check.

36. The plan of procedure will be the following:—

Before the commencement of each period of three years, an enumeration of the stock on the group to be worked during that period will be made. This enumeration will be conducted on the same principles as those described further on.

The stock on this group having been thus ascertained, a quantity amounting to 20 per cent. will be deducted on account of the trees which are to be left after the second felling, and if the fellings prescribed for the period are "first" fellings, the balance of the stock will be divided by six, and the result will be the forecast of the outturn for each year of the period. If the felling prescribed is a "second" felling, this balance divided by three will give the forecast.

The compartments of which the group or "check area" is formed will be worked over in their order, as given in the table, by a "first" felling or a "second" felling as the case may be, a careful count being kept of the quantity cut so as not to exceed the forecast in any one of the three years.

The officer making this "first" felling is expected to regulate the severity of the thinning by the requirements of the advance-growth existing or expected as far as the prescriptions of this Working Plan allow. He can, however, not remove so much as one-half the crop in a "first" felling. He may, if necessary, cut less, but may not cut more, than the forecast.

If in the third year of the period the quantity of the forecast is obtained without the limits of the group having been reached, the quantity cut will notwithstanding be restricted to this forecast, and the balance will be removed, as explained below, at the commencement of a subsequent period.

If in the third year the quantity of the forecast cannot be obtained without over-stepping the limits of the "check area," or, in the case of a "first" felling, cutting more than half of the stock, the fellings of the year, and consequently of the period, will be stopped on arrival at this limit.

The above explains how this group acts as a "check area."

Under no circumstances may the fellings prescribed for the period overstep the limits of this group.

In the case of a balance of material *to be cut* being left at the end of a period on any group, it will be left for the period prescribed for the "second" felling.

If after a "second felling" there should be a balance, it will be removed at the commencement of the next period, before the cutting of the group allotted to that period.

In preparing the forecast for this next period, no credit will be taken for this balance, but this balance when cut will be debited against this forecast, and the total quantity cut will not exceed this forecast.

Grazing.

Grazing tables.

37. The annexed grazing tables show for each Working Circle separately the periods for which the several areas will be closed or opened to grazing.

They have been prepared with a view to keeping each area in its turn closed to grazing for 54 years out of the full rotation of 108 years.

This term of 54 years will include the 12 years before and 42 years after the year fixed for the commencement of the "first" felling in the area in question.

The closing and opening of the areas will date from the first year of the period mentioned in the first column.

It has been arranged that in the same year in which an area is closed, a corresponding area in another part of the circle is opened, and this principle has been departed from only in a few cases in which the young growth is not sufficiently advanced.

The term of 54 years is short and scarcely sufficient to ensure the young crop growing up to a size beyond the reach of much harm from cattle.

A term of 60 or 70 years would have been fixed if the adoption of such a term out of a rotation of 108 years would have admitted of opening an area on the closing of a corresponding one.

Grazing Table, Western Circle.

Showing the years in which the different groups of compartments will be closed and open to grazing.*

Period of three years.		A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.	L.	M.	N.	O.	P.	Q.	R.	Remarks.
From.	To.	Balasan—6, 7, Palongdong—1, 2.	Palongdong—3, 4.	Perrusigiri—3, 2, 1.	Chongtong—5, 4, 3, 2.	Chonstone—1, 6. Rishihat—3.	Rishihat—2, 1.	Nai—3, 2, 1.	Nai—5, 4.	Goom—3. Chattakpur—1.	Pachim—3, 2, 1.	Kinchintongdham, south and north Sonada—3, 2.	Sonada—1. Rangbul—4.	Rangbul 3, 2, 1. Dooteria—2 (upper).	Dooteria—2 (lower) —3, 1.	Tungsong Poobong— 1, 4, 3, 4.	Tungsong Poobong— 5, 6, 7.	Tungsong Poobong—3. Goom—1, 2.	Balasan,—1, 2, 3, 4, 5.	
1888-89	1890-91	Close.	Close.	Close.	Open.	Open.	Open.	Open.	Open.	Open.	Open.	Open.	Open.	Close.	Close.	Close.	Close.	Close.	Close.	(a), (b), (c) are exceptions. In consequence of the backward state of the growth, these groups will not be opened till 1908, 1915, and 1912 respectively. This postponement of the date of opening will not affect the date of closing. The closing and opening of these areas will date from the first year of the period mentioned in the first column and should be carried out in April of that year.
1891-92	1893-94	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1894-95	1896-97	...	...	...	Close.	...	...	...	...	...	...	...	...	Open (a).	...	...	...	...	...	
1897-98	1899-1900	...	...	...	...	Close.	...	...	...	...	...	...	...	...	Open (b).	...	...	...	...	
1900-1	1902-3	...	...	...	...	...	Close.	...	...	...	...	...	...	...	...	Open (c).	...	...	...	
1903-4	1905-6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1906-7	1908-9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1909-10	1911-12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1912-13	1914-15	...	...	...	...	...	...	Close	...	...	...	...	...	...	...	...	Open.	...	...	
1915-16	1917-18	...	...	...	...	...	...	...	Close.	...	...	...	...	...	...	...	...	Open.	...	
1918-19	1920-21	...	...	...	...	...	...	...	...	Close.	...	...	...	...	...	...	...	...	Open.	
1921-22	1923-24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1924-25	1926-27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1927-28	1929-30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1930-31	1932-33	Open.	...	...	...	...	...	...	...	...	Close.	...	...	...	...	...	...	...	...	
1933-34	1935-36	...	Open.	...	...	...	...	...	...	...	...	Close.	...	...	...	...	...	...	...	
1936-37	1938-39	...	...	Open.	...	...	...	...	...	...	...	...	Close.	...	...	...	...	...	...	
1939-40	1941-42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1942-43	1944-45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1945-46	1947-48	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1948-49	1950-51	...	...	...	Open.	...	...	...	...	...	...	...	...	Close.	...	...	...	...	...	
1951-52	1953-54	...	...	...	...	Open.	...	...	...	...	...	...	...	...	Close.	...	...	...	...	
1954-55	1956-57	...	...	...	...	...	Open.	...	...	...	...	...	...	...	...	Close.	...	...	...	
1957-58	1959-60	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1960-61	1962-63	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1963-64	1965-66	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1966-67	1968-69	...	...	...	...	...	...	Open.	...	...	...	...	...	...	...	...	Close.	...	...	
1969-70	1971-72	...	...	...	...	...	...	...	Open.	...	...	...	...	...	...	...	...	Close.	...	
1972-73	1974-75	...	...	...	...	...	...	...	...	Open.	...	...	...	...	...	...	...	...	Close.	
1975-76	1977-78	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1978-79	1980-81	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1981-82	1983-84	...	...	...	...	...	...	...	...	...	Open.	...	...	...	...	...	...	...	...	
1984-85	1986-87	Close.	...	...	...	...	...	...	...	...	...	Open.	...	...	...	...	...	...	...	
1987-88	1989-90	...	Close.	...	...	...	...	...	...	...	...	...	Open.	...	...	...	...	...	...	
1990-91	1992-93	...	...	Close.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1993-94	1995-96	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

* These groups of compartments agree with the "check areas" of the Working Plan.

Grazing Table, Eastern Circle.

Showing the years in which the different groups of compartments will be closed and open to grazing.*

Period of three years.		A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.	L.	M.	N.	O.	P.	Q.	R.	Remarks.
From.	To.	Ramgirum—4, 5, 1, 2. Dawaipani—1.	Dawaipani—2, 3. Rungjo—1.	Rungjo—2, 3, 4.	Rungjo—5, 6, 7.	Senchal. Tiger Hill—1, 2.	Tiger Hill—3, 4. Rangbi—1.	Rangbi—2, 3, 4, 5.	Rangbi—6.	Rangbi—7. Rishap—1.	Rishap—2.	Rishap—3, 4, 5. Sureil—1.	Sureil—2, 3, 4.	Sureil—5. Mamrim—1, 2.	Mamrim—3, 4.	Chattakpur. 5, 4 (lower). 3 (lower).	Chattakpur. 4 (higher), 3 (higher). 2 Rangru—1.	Rangnu—2, 3. Dawaipani—4.	Dawaipani—5, 6. Rangiram—3.	
1888-89	1890-91	Close	Close	Close	Open	Open	Open.	Open.	Open.	Open.	Open.	Open.	Open.	Close	Close	Close	Close	Close	Close	The closing and opening of these areas will date from the first year of the period mentioned in the first column, and should be carried out in April of that year.
1891-92	1893-94	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	...	...	...	
1894-95	1896-97	...	...	...	Close.	...	...	...	...	...	...	...	...	Open	.....	.....	...	...	...	
1897-98	1899 1900	...	...	...	...	Close.	...	...	...	...	...	...	...	.....	Open	.....	...	...	...	
1900-1	1902-3	...	...	...	...	...	Close.	...	...	...	...	...	...	.....	.....	Open	...	...	...	
1903-4	1905-6	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	...	...	...	
1906-7	1908-9	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	...	...	...	
1909-10	1911-12	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	...	...	...	
1912-13	1914-15	...	...	...	...	...	...	Close	...	...	...	...	...	.....	.....	.....	Open	...	...	
1915-16	1917-18	...	...	...	...	...	...	...	Close	...	...	...	...	.....	.....	.....	...	Open	...	
1918-19	1920-21	...	...	...	...	...	...	...	...	Close	...	...	...	.....	.....	.....	...	...	Open	
1921-22	1923-24	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	...	...	...	
1924-25	1926-27	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	...	...	...	
1927-28	1929-30	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	...	...	...	
1930-31	1932-33	Open	...	...	...	...	...	...	...	...	Close	...	...	.....	.....	.....	...	...	...	
1933-34	1935-36	...	Open	...	...	...	...	...	...	...	...	Close	...	.....	.....	.....	...	...	...	
1936-37	1938-39	...	...	Open	...	...	...	...	...	...	...	...	Close	.....	.....	.....	...	...	...	
1939-40	1941-42	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	...	...	...	
1942-43	1944-45	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	...	...	...	
1945-46	1947-48	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	...	...	...	
1948-49	1950-51	...	...	...	Open	...	...	...	...	...	...	...	...	Close	.....	.....	...	...	...	
1951-52	1953-54	...	...	...	...	Open	...	...	...	...	...	...	...	.....	Close	.....	...	...	...	
1954-55	1956-57	...	...	...	...	...	Open	...	...	...	...	...	...	.....	.....	Close	...	...	...	
1957-58	1959-60	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	...	...	...	
1960-61	1962-63	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	...	...	...	
1963-64	1965-66	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	...	...	...	
1966-67	1968-69	...	...	...	...	...	...	Open	...	...	...	...	...	.....	.....	.....	Close	...	...	
1969-70	1971-72	...	...	...	...	...	...	...	Open	...	...	...	...	.....	.....	.....	...	Close	...	
1972-73	1974-75	...	...	...	...	...	...	...	...	Open	...	...	...	.....	.....	.....	...	...	Close	
1975-76	1977-78	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	...	...	...	
1978-79	1980-81	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	...	...	...	
1981-82	1983-84	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	...	...	...	
1984-85	1986-87	Close	...	...	...	...	...	...	...	...	Open	...	...	.....	.....	.....	...	...	...	
1987-88	1989-90	...	Close	...	...	...	...	...	...	...	...	Open	...	.....	.....	.....	...	...	...	
1990-91	1992-93	...	...	Close	...	...	...	...	...	...	...	...	Open	.....	.....	.....	...	...	...	
1993-94	1995-96	...	...	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	...	...	...	

* These groups of compartments agree with the "check-areas" of the Working Plan.

38. When an area is closed under this plan, and another area is at the same time opened, the graziers turned out of the former will be accommodated in the latter, and will not be allowed to select another area.

Location of graziers.

When two sites are allowed a grazier, they should be in the same group.

In the case in which the Conservator of Forests exercises the powers conferred in paragraph 39 below, these graziers will be accommodated temporarily in such other areas as the Divisional Forest Officer may select.

The local officers must not allow the clearing of new sites for grazing camps.

The sites at present existing will be entered on the working maps of the division, and will be retained for that purpose.

The damage done on these sites and in their immediate vicinity is so great as to render it improbable that closing for 54 years will render them unrecognizable.

The above arrangement will leave open to grazing in any given year approximately one-half of the forests subjected to this Working Plan.

39. Immediately before any given closed area is, under this plan, to be opened to grazing, the Divisional Forest Officer will examine it and record in the "Forest Journal" a description of the state of the growth on it, and whether or not he considers it in a fit state to be opened to grazing.

Examination of forest before opening to grazing.

If he be of opinion that the growth is not sufficiently advanced to be safe against cattle, he will apply to the Conservator for permission to keep it closed for a further fixed term of years.

The Conservator may pass an order so keeping it closed, provided that the total of excess thus closed does not exceed 20 per cent. of the area that should under this plan be open to grazing.

As this closing will entail the location of graziers temporarily in some other open area, however, he will decide whether the damage resulting from the clearing of extra sites for bathans in such areas will compensate for the benefit arising from this closing.

The description recorded in the "Forest Journal" will enable the local officers to form a more definite opinion of the amount of damage done by grazing.

40. The local officers are reminded that although the grazing rules referred to in chapter I do not expressly state that applications from graziers to increase their herds may be refused, it would be contrary to the spirit and object of the rules to allow grazing to a greater number of cattle than are absolutely necessary for the supply of milk.

Increase of grazing to be discouraged.

The number of cattle found sufficient in former years is a safe basis for this calculation, and the numbers of one-month grazing permits issued for the working circles during the last few years are given below :—

	Cows.	Bullocks.	Buffaloes.	Ponies.	Total.
1882-83	3,300(*a*)	184	122	...	3,606
1883-84	2,165	625	135	76	3,001
1884-85	2,966	(*b*)	...	87	3,053
1885-86	2,699	440	...	...	3,139
1886-87	2,866	502	...	...	3,368

(*a*) See remarks in paragraph 21.
(*b*) Included under cows.

The grazing tables will keep open to grazing at any one time approximately one-half the total area, or 9,011 acres out of the total of 18,023. This area of 9,011 acres will be reduced to 7,209 acres, if the Conservator should close the 20 per cent. he is empowered to do.

Taking, for instance, the year 1886-87, in which one-month grazing tickets were issued for 3,368 cattle, the average number of cattle grazing at any given moment was 281 heads, which number, distributed over the 7,209 acres, would give 25 acres per head.

Assuming the cattle grazing in 1886-87 sufficiently numerous to meet the demand for milk, an area of 25 acres per head is liberal compared with the area of 5 acres which alone under the grazing rules of October 1885 the Forest Department is bound to supply.

The local officers will observe that the large area given in the Working Plan will reduce the damage done to the forest if the supervision is strict, and they should with this object oppose the tendency to increase the number of cattle.

Grazing rules.

41. The grazing rules referred to are reproduced in appendix 2 to this Working Plan.

(3).—*Fodder.*

Fodder supply tables.

42. It is necessary to institute a rotation for the supply of fodder.

By this word "fodder" is implied grass, the leaves of bamboo and the shrub kibu (*Impatiens*) to be cut and removed for cattle.

The forest beats have been classed as "near" and "distant," as below—

Western Circle.			Eastern Circle.		
	Near.	*Distant.*		*Near.*	*Distant.*
(*a*).	Tungsong-Poobong	Permaigiri.	(*a*).	Rangnu	Rishap.
(*b*).	Chongtong.			Rangirum	Sureil.
	Rishihat.		(*b*).	Dawaipani	Mamrim.
(*c*).	Nai.			Rungjo	Chattakpur.
	Goom.		(*c*).	Tiger Hill.	
(*d*).	Balasan.		(*d*).	Rangbi.	
	Palongdong.				
(*a*).	Rangbul.				
(*b*).	Sonada.				
(*c*).	Dooteria.				
(*d*).	Pachim.				

The near beats will ordinarily be opened in rotation, left open for one year and then closed; the distant beats may be opened by the divisional officer.

In 1888-89 the beats marked "*a*" will be opened.
„ 1889-90 ditto "*b*" ditto.
„ 1890-91 ditto "*c*" ditto.
„ 1891-92 ditto "*d*" ditto.
&c., &c.

the "*a*" beats being opened in April of every leap-year, and the others in their order.

The divisional officer may close any beat in which he finds the fodder cutters are doing injury to the growth, and may leave the other beats of the year to supply the demand or may open one of the distant beats.

(4).—*Planting and sowing.*

Restocking blanks and fencing.

43. The only blank areas that at present require stocking artificially in the Western Circle are the lower parts of the Balasan aud Palongdong beats, being about 172 acres in the former and 202 in the latter.

These areas will be restocked artificially at the rate of 100 acres yearly commencing in 1889-90.

In consequence of the numerous grazing bathans outside the forest boundary just below these beats, a fence will be erected and a thick hedge planted along this boundary in 1888-89. For the hedge, cuttings of erythrina (phalloda) are recommended.

In 1888-89, to facilitate the work of planting and protection, a house for the permanent residence of a forest guard and a rest-house for the forest ranger will be erected in the lower part of Palongdong, compartment 2 or 3.

In 1889-90 the artificial re-stocking of the above areas will be commenced. The thick turf will be broken up, and long, narrow, roughly-made nursery beds will be dug following the contour of the slope at distances of about 20 feet.

These beds will be two feet in breadth, and will be hoed to a depth of $1\frac{1}{2}$ feet. They will be sown with seed of maple, champ, pipli and oak. This

work can be done in the cold weather, and all transport of seedlings will be avoided. The seedlings resulting will be left *in situ*, and will merely be thinned out when necessary.

It is necessary that all plantations near the lower boundary should consist of trees that cattle do not readily eat.

In many other places the lower parts of the beats are poorly stocked, but the natural growth of kharani, jhingni, &c., is sufficiently good.

In 1894-95 similar measures to those above prescribed will be adopted in the Eastern Circle for restocking the lower part of the Rungjo beat.

In the first year a fence and a hedge will be made, and in the following year sowings will be executed.

Annual sowings prescribed.

44. Every year on the falling of the acorns in each working circle in the two groups of compartments last closed to grazing, parties of coolies will be driven through the forest and made to "dibble-in" the acorns found on the ground and shaken from the trees.

This operation will be repeated yearly over the same area until this area is replaced by another more recently closed to grazing.

A sum of Rs. 25 in each working circle should be allotted yearly to this work, and in every year in which there is a plentiful crop of acorns, such as occurs approximately every third or fourth year, these sums should be doubled.

Acorns for restocking nurseries should not be collected from these areas.

Thus in the year 1900-1, for example, acorns should be "dibbled-in" in groups E F of both working circles (see grazing tables), and this operation will be repeated in these areas up to 1911-12 inclusive. From 1912-13 to 1914-15 the areas will be F and G, and from 1915-16 the areas will be G and H, and so on.

Maintenance of nurseries.

45. In each working circle nurseries will be maintained in convenient places aggregating not less than $1\frac{1}{4}$ acres, sufficient to contain 100,000 seedlings when filled, or, for the two working circles, 200,000. The sites recommended are the existing ones at Goompahar for the Western Circle and Rangirum for the Eastern. The number of seedlings required in any one year for planting under a "first" felling is not likely to exceed 10,000 for each working circle. These plants must be at least two years old, and good oak-fruiting years do not occur annually: further, a large margin must be left for deaths in the nursery.

Seedlings in excess of the requirements of the Department may be sold.

(5).—*Roads and Buildings.*

Road-making and house-building.

46. The roads and inspection-paths required are given in the following list. If they are not constructed before, it is important that they should be executed in the years prescribed. There is of course no reason, when funds are available, why additional paths should not be constructed, or why these prescribed paths should not be made in anticipation of the provision of this plan:—

Statement of roads and inspection paths and houses to be constructed during the first 14 *years of the rotation.*

WESTERN CIRCLE.

Year of construction.	Name or description of road or inspection path or house.
1888-89 to 1892-93	*A.*—Extension of the existing cart road from Lepchajagat to the end of the Working Circle. Government has been asked to allow the Public Works Department to execute this work; it has been requested that 2 miles be made in 1888-89 and 1 mile in each succeeding year.
1888-89 ...	*B.*—An inspection path connecting the lower part of compartment 7, Balasan, with the main road near Sukia Pokri. Probable length $1\frac{1}{2}$ miles. Cost from Rs. 30 to Rs. 50 per mile.

Year of construction.	Name or description of road or inspection path or house.
1888-89 ...	*C.*—A path connecting the lower part of Palongdong, compartment 8, with the main road at Sukia Pokri, with a branch to Jor Pokri. Probable length 3 miles. Cost Rs. 30 to Rs. 50 per mile. (*N.B.*—Arrangements have been made to construct this path in 1887-88 before the Working Plan comes into force.)
Ditto ...	A guard's house should be erected at the lower part of this compartment, and he will live here to protect the forest against graziers.
Ditto ...	A house for the forester should be erected here as a residence for him during the work of replanting. Probable cost of these two houses, Rs. 50.
Ditto ...	*D.*—A path connecting the above two paths and traversing the lower portions of compartments 7, Balasan, and 1, 2, and 3, Palongdong, near their lower boundaries. Estimated length 1½ miles, at Rs. 30 per mile.
1889-90 ...	*E.*—A path in the Balasan beat from the lower boundary up the 1-2 spur to the main road, with a branch from the lower part of this line across compartment 2 to meet the 2-3 spur path. Probable length 2½ to 3 miles. Cost at Rs. 30 to Rs. 50 a mile.
1890-91 ...	*F.*—An inspection path from the lower boundary Balasan beat to the main road following the spur of compartment line 5-6. Length about 1 mile. Cost about Rs. 50.
Ditto ...	*G.*—A path in the Balasan beat from the lower boundary up the 2-3 spur to the main road. Probable length 1 mile. Cost from Rs. 30 to Rs. 50.
1891-92 ...	*H.*—A path in the Nai beat from the lower boundary on the Barbattia spur across compartment 1 Nai and up the 1-2 line to the Nai inspection path. Probable length 1½ miles. Probable cost Rs. 30 to Rs. 50 a mile.
1892-93 ...	*I.*—A path in the Permaigiri beat from the lower boundary up the 2 – 3 spur. Probable length 1 mile. Probable cost Rs. 30 to Rs. 50.
Ditto ...	A branch path running westward from the above horizontally through compartment 3 to its western boundary. Probable length 1 mile.
Ditto ...	Another branch running eastward through compartments 2 and 1 to the Sukia spur. Probable length 1½ miles. Probable cost Rs. 30 to Rs 50 a mile.
1893-94 ...	*J.*—A path in the Rishihat beat from the bottom of the 1-2 compartment line, across compartment 2 to the 2-3 line, and back again to the Rishihat spur path near Lepcha Jagat Probable length 4 miles. Cost Rs. 30 to Rs. 50 per mile. These directions should be followed as nearly as the nature of the ground will allow.
1894-95 ...	*K.*—A path in the Nai beat up the 2-3 line from the lower boundary. Probable length 2 miles. Cost Rs. 30 to Rs 50 a mile.
1894-85 ...	*L.*—A path in the Pachim beat up a spur to the main ridge. Probable length ¾ of a mile. Cost about Rs. 30
1898-99 ...	*M.*—A path in the Goom beat from the Barbattia spur through compartment 3 Goom to meet the Bloomfield-Rishihat road. Probable length 1 mile. Cost Rs. 30 to Rs. 50.

Eastern Circle.

1888-89 ...	*A.*—A path from near the Rangirum bungalow up the spur between the Rangirum and Dawaipani beats. Probable length one mile. Cost Rs. 30 to 50.
Ditto ...	*B.*—A path along the main ridge from Senchal W. through Tiger Hill and Senchal G. T. S. to the top of the Rishap spur. Approximate length seven miles. Two miles of the above. Probable cost Rs. 60. A portion of an old existing road can probably be utilized in making this.
1889-90 ...	*C.*—Two miles of ditto. Probable cost Rs. 60.
Ditto ...	An inspection hut for the Forest Ranger in the lower part of compartment 4, Sureil.
1890-91 ...	*D.*—Three miles of above road. Probable cost Rs. 90.
1891-92 ...	*E.*—The Dawaipani inspection path to be completed and repaired. Probable length two miles. Cost Rs. 50.
Ditto ...	*F.*—A path up the 2-3 spur Dawaipani. Length about one mile. Cost Rs. 30 to Rs. 50.
1892-93 ...	*G.*—A path in the Rungjo beat up the 1-2 line. Length probably one mile. Cost Rs. 30 to Rs. 50.
Ditto ...	In this year a rest-house on the plan of the Pachim rest-house should be built in compartment 3 or 4 Rishap to ensure constant inspection.
1893-94 ...	*H.*—A path from this line through compartment 2 and up the spur of the 2-3 line. Probable length 1½ miles. Cost Rs. 40.
Ditto ...	A hut for the permanent residence of a forest guard and a rest-house for the forester should be erected at the foot of this path. Probable cost Rs. 50.
1894-95 ...	*I.*—A path in the Mamrim beat from the lower boundary up the spur of the 2-3 line, crossing the existing Mamrim beat path and continuing up to the old military road. Probable length two miles. Cost Rs. 30 to Rs. 50 a mile.
1895-96 ...	*J.*—A path in the Rungjo beat from the lower boundary to the road opening out compartments 5 and 6. Probable length four miles. Cost Rs. 30 to Rs. 50 a mile.
Ditto ...	*K.*—In the Tiger Hill beat a path up the spur of the 1-2 line to meet the existing path on the spur between Senchal and Tiger Hill beats. Probable length one mile. Cost Rs. 30 to Rs. 50 per mile.
1896-97 ...	*L.*—A path from near the Sureil bungalow up the Rishap spur to the ridge. Probable length five miles. Cost Rs. 40 a mile. This path should pass through the extremities of the compartment lines of the Rishap and Sureil beats which now abut on the existing path running up this spur.

Year of construction.	Name or description of road or inspection path or house.
1897-98 ...	*M.*—A path up the Rangbi spur from the road to the ridge. Probable length 2½ miles. Cost Rs. 30 to Rs. 50 a mile.
Ditto ...	*N.*—A path in the Tiger Hill beat up the 3-4 line to meet the above. Probable length three fourths of a mile. Cost Rs. 30.
1898-99 ...	*O.*—A path in the Rangbi beat from the lower road through compartment 3 to meet the path on the Tiger Hill Rangbi spur. Probable length two miles. Cost Rs. 30 to Rs. 50 a mile.
1899-1900 ...	*P.*—A path in the Rishap beat up the spur of the 2-3 line to meet the Rishap spur path. Probable length 1½ miles. Cost Rs. 30 to Rs. 50 a mile.
Ditto ...	*Q.*—In the Sureil beat a path should be made from the bottom of the 4-5 line through compartment 4 to join the road on the Rishap spur. Probable length two miles. Cost Rs. 50 per mile.
1900-1901 ...	*R.*—In the Chattakpur beat a path from the bottom of the 1-2 line should ascend through compartments 2 and 3 by an easy gradient to the old military road, and from thence should continue to the ridge and by the ridge to the top of the Rishap spur. Probable length 5 miles at Rs. 40 a mile.
1901-1902 ...	For this and the succeeding years no special road-making is prescribed. Paths should be made to facilitate the inspection of all grazing bathans. The local officers are recommended to improve the paths in the Tiger Hill, Rangbi, Rishap and Sureil beats to facilitate the carriage by coolies of the firewood and charcoal to the main ridge, and the construction of slides to convey this fuel to the hill cart-road on the west side of the ridge.

(6).—*Sylvicultural treatment.*

Regeneration fellings or principal fellings.

47. The fellings termed "first" and "second" respectively, mentioned in the above working table, will be executed on the following principles:—

These two fellings together are termed principal fellings, and their object is to remove most of the old mature stock, leaving in its place a young crop of seedlings sufficiently strong to dispense with the shelter of large trees, and sufficiently thick to completely cover and protect the soil, either at once or within a very few years' time.

The usual conditions of advance-growth under the forest, which has arrived at its turn for these principal fellings, is described in paragraphs 30-31 above.

First felling.

48. The "first" felling will consist in cutting out less than half the old stock, and will be merely a heavy thinning of the mature forest.

This felling will not be uniformly heavy over the whole area of the year's coupe.

Where advance-growth already exists, and is sufficiently strong to bear exposure (and it must not be forgotten that frost is of daily occurrence in the winter), almost the whole of the old crop may be removed.

In places where the advance-growth is poor, or does not exist, this felling will, as far as practicable, merely thin out the top cover by cutting trees at short intervals, and the tops of these trees so left should be pretty evenly distributed, so that, while the protection of the soil is ensured, sufficient seed-bearers will be left, which will themselves afford sufficient shelter to the existing or expected crop of seedlings.

As far as possible trees should be selected of which the tops by their position are most likely to escape serious damage from the falling of the others.

The trees so left should include a fair proportion of maple (kabashi) and other species of which the natural reproduction is easy and will generally consist of trees with good spreading tops.

At the time of this "first" felling the surface of the ground should be cleared of weeds, brambles and kibu, so as to allow seedlings to spring up.

Planting under a first felling.

49. In all cases in which seedlings of oak, magnolia (champ) or chestnut, or a mixture of these species, do not exist at the time of this "first" felling to the extent of an average of 20 per acre over the year's coupe, seedlings at least two years old of these species will be planted out at the time of this "first" felling to the number of 50 per acre on the average.

These plants need not necessarily be put out in regular lines, but will be planted in the positions most favourable for growth: for instance where the soil is good or sheltered.

These plants should generally be "cut-back" on a level with the ground after planting, and with the future natural growth of kharani, maples, &c., will complete the advance-growth. The kharani seedlings and bushes in the immediate vicinity of these transplants should be cut back to allow the young transplants a better chance.

Cutting back injured growth

50. All young growth damaged by the felling of the big trees will also be "cut-back" by the officer in charge of the range and his forest guards in his presence, assisted by not more than one or two picked coolies.

Second felling.

51. The second felling will consist in the removal of the greater part of the remaining stock, leaving all seedlings, saplings, and poles under 9 inches in diameter, and large well-grown timber trees likely to live for a further term of 20 to 50 years to the extent of three per acre or about 500 on the average area worked in one year's "second" felling. Those least likely to be seriously damaged in the felling of the other trees should of course be selected.

The trees that are left should by preference stand over those places in which the advance-growth is thinnest. A few well-grown and sound trees of oak or champ may be left to attain exceptional size for timber, but such trees should not exceed about one to the acre. In places where the crop of advance-growth is thin, a few healthy, mature maples, or in default magnolias, should be left as seed-bearers; and these will afterwards be removed in the periodical thinnings or jardinage fellings.

After this felling also the Range Officer will "cut-back" all injured young growth.

Improvement cuttings.

52. The working tables, in addition to giving the year fixed for the principal fellings, give also the year in which cleanings, thinnings and jardinage fellings will be executed. Additional cleanings may be made in the seedling crop if required.

These operations will be executed under the personal supervision of the Divisional or Sub-Divisional Forest Officer in the years prescribed, and in accordance with the sylvicultural principles indicated below.

Cleanings.

53. The "cleaning" will consist in cutting down or topping off the brambles, bamboos, wormwood and other foul growth which dominate or threaten to dominate and thereby endanger tree seedlings.

In the case of a young kharani or other bush of an inferior kind threatening the existence of a promising seedling, of oak or champ for instance, the obstructing branches of the former may be lopped off or, if necessary, it may be "cut-back" so as merely to disengage the leading shoot of the more valuable seedling.

Care should be taken not to expose the soil which cannot be too thickly covered, and it should be remembered that all jungle and even weeds are useful in assisting to form a complete canopy over the soil.

Advantage will be taken of this occasion to "cut-back" all saplings and seedlings damaged by the fellings of the big trees which will have taken place from three to six years previously.

Thinnings.

54. Three thinnings are prescribed. At the dates prescribed, the forest will consist principally of saplings and small poles, the tops of which ought to be closely packed and form a complete canopy.

The object of a thinning will be to free slightly the tops of the saplings and poles which are strong and likely to grow into young trees, so as to reduce the struggle for existence among trees too crowded.

Care will again be taken not to expose the soil by over thinning.

This operation should, under no circumstances, isolate the tops of these young trees. It is intended only to improve the growth, and any revenue derivable from it is a matter of secondary importance.

The first of these thinnings will probably partake of the nature of a cleaning by occasionally removing a sapling overtopping another of better species; but these thinnings will generally remove the overtopped rather than the overtopping trees, and the felling of the trees cut will therefore do little damage to those left.

Any tree left standing in the "second" felling, which is dying and cannot await the arrival of the next felling (thinning or jardinage felling) prescribed in the working table, may be cut at the time of this thinning.

Jardinage fellings.

55. It is not considered advisable to make any thinnings in the forest after it has been opened to grazing. In order, however, to utilize any trees that may be dead or dying, and which cannot await the return of the principal fellings, two jardinage fellings are prescribed.

These fellings will consist in removing fallen wood and trees that are dead or nearly dead, and which could not last till the return of the fellings, 23 years afterwards, without absolute decay.

No produce other than the above will be removed under the head of jardinage fellings.

Wood that is actually fallen may be removed in any of the prescribed "thinnings" or "jardinage" fellings, or at any other time if the divisional officer considers the supervision sufficient.

(7).—*Estimation of capability.*

Forecast of outturn—method of calculation.

56. In Appendix 3 are given the detailed calculations for the first period 1888-89 to 1890-91, and a similar method will be adopted in the preparation of future forecasts.

An enumeration of the stock over the whole of a group or "check-area," as in the present case, or on sample areas in this group, aggregating not less than 50 acres, will be made.

The enumerator marches a gang of four to six coolies abreast through the forest, making a first traverse along the boundary of the area, and in his second traverse returns parallel to and adjoining the first, and so on. The trees are measured with diameter-gauges at breast height by the coolies, who call out the species and diameter class, at the same time marking them with claws to prevent re-counting the same trees.

The enumerator records the result in a form similar to that of Appendix 3(*a*), all trees between 9 inches and 1 foot 3 inches in diameter being entered as one foot, and those between 1 foot 3 inches and 1 foot 9 inches as 1½ feet, &c.; all trees over 4 feet 3 inches in diameter being classed as 4 feet 6 inches to compensate for the generally hollow nature of trees of greater diameter. The four species-classes given in this table are sufficient for the purpose of forecast.

From the results of the enumeration the diameter of a type tree for each species-class is obtained as in Appendix 3(*b*), and two or three specimen trees for each of the four species-classes, of fairly average form, are felled and cut into firewood, which is stacked and measured in cords.

The mean out-turn of these two or three trees gives the necessary data for column 5 of Appendix 3 (*c*), which appendix shows how the calculation of the forecast is completed.

A cord is a stack measuring 128 cubic feet, of which the dimensions are usually 8 feet by 4 feet by 4 feet.

Result of calculation for first period.

57. The forecast for each of the three years 1888-89, 1889-90, 1890-91 is for the—

Western Circle	...	...	...	3,800	
Eastern „	...	...	...	4,400	
		Total	...	8,200	cords, firewood.

Allowing 30 per cent. of this for charcoal, the out-turn would be—

Firewood, 5,740 cords	...	...	...	5,740
Charcoal, 24,600 mds.	...	...	...	2,460
		Total	...	8,200 cords.

In the above it is assumed that 1 cord of firewood will yield 10 maunds charcoal; see paragraph 22 above.

General capability.

58. With a view to obtaining more exact figures as a general average annual capability for the whole of the rotation, a more detailed enumeration and calculation of the stock was made over areas of mature forest in the two working circles, aggregating 2,389 acres.

Appendix 4 gives the results of the enumeration and calculations, which latter were made in a similar manner to those shown in Apppendix 3.

The stock per acre is estimated to be 70 cords, and the average annual out-turn of the principal fellings to be 9,000 cords.

The cubic contents, solid, of an average cord of firewood are not accurately known, but are believed to be about 82 cubic feet.

It will be observed from Appendix 4 that, in consequence of the grazing rules allowing the lopping of the two trees *Chindia* and *Dudila*, the capability is somewhat less than it would otherwise have been; but the grazing and lopping by the graziers affects the quality rather than the quantity of the out-turn.

The term "principal fellings" is applied to the "first" and "second" fellings, and the term "principal produce" to the out-turn of these fellings, all other produce and out-turn of wood being termed "accessory."

The forecast refers to the principal produce only. From the nature of the thinnings and of the jardinage fellings prescribed in paragraphs 54 and 55, it is evident that no forecast can be made for them.

Maintenance of a reserve stock of fuel.

59. The out-turn of the latter will sometimes be considerable, and from this accessory produce and from such as may be available out of "principal fellings" the Forest Department should gradually raise the existing reserve stock of firewood and charcoal in its depôts to a quantity equivalent to 3,000 cords of firewood, and should then maintain that quantity, selling portions and replacing them in order to avoid deterioration, this reserve stock being maintained to provide against sudden and serious falls in the out-turn. When the quantity of the forecast considerably exceeds the demand, the excess could usefully be utilised by the Department to raise its reserve stock.

This stock should not be indented on unless the forecast show an expected annual out-turn of less than 6,000 cords, in which case the quantity required to raise the out-turn to this figure should be sold.

CHAPTER IV.

CONTROL.

Out-turn.

60. The annual out-turn will be limited to the capability as explained in paragraphs 35 and 36 above. This out-turn cannot be regulated by the demand, as has been the case in previous years.

From the statistics given in paragraph 22 the average annual demand on the forests constituting these two working circles for the four years ending 1885-86 was nearly 650,000 cubic feet solid of wood, which expressed in firewood would be about 7,900 cords. The demand of a single year has been considerably higher.

The annual capability of these forests expressed in firewood is estimated at 9,000 cords as shown in paragraph 58, but the annual out-turn will occasionally differ considerably from this figure, which can be regarded merely as an approximate average.

Disposal of out-turn.

61. The records of the Department show that the demand of Jalapahar for fuel during the four years ending with 1885-86 was less than 22 per cent. of the total demand for fuel of Darjeeling and Jalapahar combined, and paragraph 22 gives the demand for fuel of the tea estates.

It is impracticable to lay down any rules as to how the market is to be supplied, or prescribe that any given proportion or quantity of the out-turn

shall be offered for sale at Darjeeling or at Jalapahar or at any given place These questions must be left to the local officers to decide from time to time. The following is offered as a suggestion which commends itself to the present local forest officers :—

The material to be cut should be put up to auction in lots and sold to the highest approved bidder either standing in the forest or after being felled by the Forest Department, and such purchaser should be at liberty to do what he then pleases with the produce, removing it in whatever form, and carrying it to whatever market he likes, merely being bound to observe the conditions as to cutting, removal, &c., that may be necessary in the interests of the forest. One objection to this is that it would be to the interests of this dealer to sell the wood to a neighbouring tea-garden at a price much below the Darjeeling price, and the planter could compete with the Darjeeling resident. It should also be noted that the price of firewood and charcoal in Darjeeling must necessarily rise as the forests worked get more distant, and when this price reaches the point when it becomes the interest of the public to substitute coal, the demand for firewood in the station of Darjeeling will cease, and in the mean time the planters will have provided themselves with machines suited to coal. The above is an argument in favour of a long rotation so as to facilitate the ultimate working of the forests for timber as distinguished from fuel.

62. With reference to the above allusion to coal, it may be mentioned that the Darjeeling Railway Company is now offering coal from Burrakur at the Darjeeling railway station at Re. 1 per maund. The sales of this coal average about 300 maunds a month in Darjeeling; for example, the Eden Sanitarium and the Darjeeling Jail burn this coal. Its use of course necessitates grates, with which the Darjeeling houses are not provided.

Maintenance of compartment lines and forest boundaries.

63. The configuration of the ground has rendered the marking out of the compartments difficult. The lines separating the compartments in almost every case follow spurs, often steep and difficult. These lines have been cleared and at every few yards a tree has been marked with a ring of white paint. Posts bearing the numbers of the compartments have been erected at the extremities of these lines To prevent the possibility of these lines being lost, it has been considered necessary to record in appendix 5 to this Working Plan a description of each line. All these compartment lines will be cleared once a year at the same time that the forest boundary lines are cleared.

The trees on these compartment lines will be repainted, and, when necessary, the compartment posts will be renewed once every three years. This will entail an annual expenditure of about two to three maunds white paint. In the first year 1888-89 the compartment lines in the under-mentioned beats marked (*a*) will be repainted and the posts renewed.

In 1889-90 the beats marked (*b*) will be similarly treated.
In 1890-91 ,, ,, (*c*) ,, ,, ,,
And so on in rotation.

	Western Circle.	*Eastern Circle.*
(*a*) Includes	Tungsong Poobong	Rangnu.
	Balasan	Rangirum.
	Palongdong	Dawaipani.
(*b*) ,,	Permaigiri	Rungjo.
	Chongtong	Senchal.
	Rishihat	Tiger Hill
	Nai	
	Goom	Rangbi.
(*c*) ,,	Chattakpur	Rishap.
	Pachim	
	Sonada	Sureil.
	Rangbul	
	Dooteria	Mamrim.

At the same time that the compartment posts are renewed, the forest boundary pillars will be repaired and their numbers renewed where necessary.

Forest journals.

64. In 1883 a forest journal such as that described by the Forest Department Code was opened for these forests, and has been kept up. This book will be kept up in its present form. The forest journals now kept by the officers in charge of the forest ranges will be maintained in the same form as hitherto.

In paragraph 39 it is prescribed that before opening an area to grazing a detailed description of the growth on this area shall be recorded in this forest journal. A description of the growth on each group of compartments will also be recorded before the closing of an area to grazing.

Record of execution and result of operations.

65. After the execution of any one of the following operations, the Divisional Officer will record in his forest journal the manner in which it has been carried out, the area, date, and officers by whom it was executed :—

"First" and "second" felling.
Cleaning.
Thinning.
Jardinage felling.
Cutting back injured growth.

After each description sufficient space will be left for the observations of himself and other officers on inspections of these areas in after years with a view to recording the progress of the growth and to detecting errors in the treatment.

In the case of the "principal" and jardinage fellings, the out-turn of the fellings will be recorded as soon as this is ascertained.

Responsibility of officers in selection of trees for felling

66. The divisional officer (or sub-divisional officer under the Conservator's order) will keep in his own possession, under lock and key, a special marking hammer, differing in design from all others in use, and this personal hammer will not be used by any officer but himself. All standing trees to be felled in a "first," "second" or jardinage felling, or in a thinning, will be marked with this hammer or the personal hammer of his superior officer, that is, the Conservator or divisional officer.

Each range officer will have a personal hammer which he will use in marking fallen timber for cutting and removal in the above fellings.

To prevent unnecessary delay in the execution of these markings, the divisional (or sub-divisional) officer may keep and use two or three personal hammers of the same design instead of one only, but they will only be used in his presence and for the purpose of marking trees selected by him personally, and must similarly be continuously in his own custody. In the case of fallen timber sold on permit for sawing, and marked by the range officer, he will by means of dies affix the permit number to it, unless a more efficient check is hereafter substituted by the Conservator.

Control over fellings.

67. In the execution of the principal fellings, paragraph 36 of this working plan requires the out-turn to be limited to the forecast.

It will assist the officer if, while marking the trees for felling, he notes the number of trees he marks. This will enable him roughly to estimate the quantity of material marked and prevent his exceeding the forecast.

In the group of compartments (check-area) prescribed in the working table, he will work the compartments in the order given in that table, and will complete the marking in the first of these compartments before proceeding to the second, and so on. He should generally commence at the lowest part of the compartment, and work gradually upwards. He should traverse a belt of forest parallel to the lower boundary of the compartment, and on selecting the trees for felling, should mark them at the root on the upper side so as to recognise them in his next traverse parallel to and above the previous one. The marks affixed to the roots of the trees will remain after the felling of the trees. He should keep a note of the trees marked in a form similar to the following :—

Working Circle.

Name of "check-area."
Name of compartment.
Felling of the season 18 -18 .

"First" felling.

Executed by ——————————————, Divisional Officer.

Assisted by ——————————————, Ranger.

Tree marked for felling.

Name.	Large. Above in diameter.	Medium. From to	Small. Under in diameter	Remarks.

The quantity of the forecast is ——————cords of firewood.
We estimate the average large trees marked will yield ——cords.
Ditto ditto medium ditto ,,
Ditto ditto small ditto ,,
Our estimate of the quantity marked is—
——————large trees at ————
——————medium ,, ————
——————small ,, ————

Total ... cords.

The hammers used in the above operations were the personal hammers of Mr. A. B., Divisional officer.

Date.

Signatures.

Copy forwarded to the Conservator of Forests, Bengal, for information.

This form will be required only in the case of "first" and "second" fellings. Trees marked for timber and for charcoal will be entered in the estimate as cords of firewood; and by comparing these estimates with the actuals which will subsequently be known, reliable data for future estimates will be obtained. As a guide to commence with, it may be noted that an average oak has a diameter of about 2 feet 2 inches and gives 1·9 cord, and an average kawala a diameter of about 1 foot 7 inches and gives one cord, but these figures are merely approximate.

Penalties and prohibitions.

68. For every unmarked tree felled, whether or not it had been previously injured by the falling of another tree, a forfeit should be prescribed in the conditions of sale or of contract according as the trees are felled by a purchaser or by a contractor for the Department. Poles and saplings will not be allowed to be cut for saw-benches. Even those said to be broken by the fall of the tree to be sawn should not be given.

69. Sawyers and wood-cutters should not be allowed to live in the forest except on the authorised camping grounds on the roadside.

Control over grazing.

70. A few final remarks must be added to the previous ones on the subject of grazing and lopping by graziers for the guidance of the forest officers. The graziers have in some cases without authority started small plots of cultivation; this will not be allowed. The prosecutions under the Act and rules for illicit grazing and lopping should be closely watched. Comparatively few of these offences are detected and put into court, and the tendency of the courts is to give inadequate sentences and thus unintentionally to encourage these practices.

It is found necessary occasionally to visit the *bathans* at night; otherwise there is little chance of detecting an unauthorised increase in the cattle.

With a view to stop the damage done to the lower parts of the forests by the cattle and lopping of men living just outside the forest boundary, these places should be made easily accessible by inspection paths, and forest guards should be made to live on the spot as far as practicable.

Insufficiency of present grazing rules.

71. The grazing rules in force already referred to differ in many respects from the draft rules prepared by the Conservator of Forests.

The graziers' *bathans* in the forest are at considerable distances apart. Each grazier lops the trees in the vicinity of his own *bathan*. What is required is that the forest officer be able to dispense with the ocular evidence required for a conviction under section 25 of the Indian Forest Act, and be able to obtain a conviction under sections 78 of that Act and 408 of the Indian Penal Code in cases where wilful damage has been done within a reasonable distance of one of these grazing camps, and no report has been made to the forest officer by the grazier. The court at present refuses convictions under section 78 in the absence of ocular evidence that this lopping had actually been observed by the grazier.

Some system of marking and registering the cattle allowed to graze is also necessary to facilitate control.

The local officers should move for an addition to the rules on the first opportunity, and their attention is invited to paragraph 20 of this Working Plan and the desirability of ridding the forest of grazing when opportunity offers.

Abstract of operations prescribed for the next 18 years.

72. The following table contains an abstract of the preceding tables, showing for each of the first eighteen years of the rotation 1888-89 to 1905-6 the operations to be performed:—

Abstract showing the operations to be executed in each of the first 18 *years of the rotation* 1888-89 *to* 1905-86.

WESTERN CIRCLE.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	
YEAR.	"First" felling.	"Second" felling.	Cleanings.	Thinnings.	Jardinage felling.	Re-stocking blanks, see paragraph 43.	Closing to grazing.	Opening to grazing.	Beats open to fodder cutting, see paragraph 42.	Roads to make and buildings to erect.	Compartment lines to clear: forest boundary lines to clear.	Compartment lines to repaint and posts to renew, Forest boundary pillars to repair or renew, see paragraph 63.	Dibbling in seed.	REMARKS.
1888-89 ..	A	.	Q	O	...	See paragraph 43.	...	...	*a*	A B C D	All	*a*	B C	
1889-90 ...	,,	...	,,	O	...	Ditto	...	...	*b*	E	,,	*b*	B C	
1890-91 ...	,,	...	,,	O	...	Ditto	...	...	*c*	F G	,,	*c*	B C	
1891-92 ...	B	...	R	P M	...	Ditto	...	...	*d*	H	,,	*a*	B C	For the meaning of the letters in the 2nd column, see paragraph 84 (working tables).
1892-93 ...	,,	...	,,	P M	...	Ditto	...	...	*a*	I	,,	*b*	B C	Ditto ditto 3rd ditto.
1893-94 ...	,,	...	,,	P M	...	.....	...	...	*b*	J	,,	*c*	B C	Ditto ditto 4th ditto.
1894-95 ...	C	...	...	P N	...	.....	D	...	*c*	K L	,,	*a*	C D	Ditto ditto 5th ditto.
1895-96 ...	,,	...	...	O N	...	.....	...	...	*d*	.....	,,	*b*	C D	Ditto ditto 6th ditto.
1896-97 ...	,,	...	...	O N	J	.....	...	...	*a*	.....	,,	*c*	C D	Ditto ditto 8th ditto 37.
1897-98 ...	...	A	...	O O	...	.....	E	...	*b*	.....	,,	*a*	D E	Ditto ditto 9th ditto.
1898-99 ...	...	,,	...	O O	...	.....	...	...	*c*	M	,,	*b*	D E	Ditto ditto 10th ditto 42.
1899-1900 ...	...	,,	...	O O	K	.....	...	...	*d*	.....	,,	*c*	D E	Ditto ditto 11th ditto 46.
1900-1 ...	...	B	...	P P	G	.....	F	...	*a*	.....	,,	*a*	E F	Ditto ditto 13th ditto 63.
1901-2 ...	...	,,	...	P P	G	.....	...	...	*b*	.....	,,	*b*	E F	Ditto ditto 14th, see paras. 34 & 44.
1902-3 ...	...	,,	...	P P	L	.....	...	...	*c*	.....	,,	*c*	E F	
1903-4 ...	...	C	A	Q Q	...	.....	...	...	*d*	.....	,,	*a*	E F	
1904-5 ...	...	,,	,,	Q Q	H	.....	...	...	*a*	.....	,,	*b*	E F	
1905-6 ...	...	,,	,,	Q Q	...	.....	...	...	*b*	.....	,,	*c*	E F	

EASTERN CIRCLE.

1888-89 ...	A	...	Q	O	...	.....	...	...	*a*	A B	All	*a*	B C	
1889-90 ...	,,	...	,,	O	...	.....	...	...	*b*	C	,,	*b*	B C	
1890-91 ...	,,	...	,,	O	...	.....	...	...	*c*	D	,,	*c*	B C	
1891-92 ...	B	...	R	P M	...	.....	...	...	*d*	E F	,,	*a*	B C	
1892-93 ...	,,	...	,,	P M	...	.....	...	...	*a*	G	,,	*b*	B C	
1893-94 ...	,,	...	,,	P M	...	.....	...	...	*b*	H	,,	*c*	B C	
1894-95 ...	C	...	...	P N	...	See para. 43	D	M	*c*	I	,,	*a*	C D	
1895-96 ...	,,	...	...	O N	...	,,	...	...	*d*	J K	,,	*b*	C D	
1896-97 ...	,,	...	...	O N	J	,,	...	...	*a*	L	,,	*c*	C D	
1897-98 ...	...	A	...	O O	...	.....	E	N	*b*	M N	,,	*a*	D E	
1898-99 ...	...	,,	...	O O	...	.....	...	...	*c*	O	,,	*b*	D E	
1899-1900 ...	...	,,	...	O O	K	.....	...	O	*d*	P Q	,,	*c*	D E	
1900-1 ...	...	B	...	P P	...	.....	F	...	*a*	R	,,	*a*	E F	
1901-2 ...	...	,,	...	P P	G	.....	...	...	*b*	.....	,,	*b*	E F	
1902-3 ...	...	,,	...	P P	L	.....	...	...	*c*	.....	,,	*c*	E F	
1903-4 ...	...	C	A	Q Q	...	.....	...	...	*d*	.....	,,	*a*	E F	
1904-5 ...	...	,,	,,	Q Q	H	.....	...	...	*a*	.....	,,	*b*	E F	
1905-6 ...	..	,,	,,	Q Q	...	.....	...	...	*b*	.....	,,	*c*	E F	

APPENDIX 1.

Record of graziers and cattle in the forests of the Darjeeling Sub-Division under the grazing rules of the 10th October and 19th November 1885, referred to in paragraph 27 of this Working Plan.

NOTE.—The entries in italics have reference to graziers who are permitted to shift their *bathans* for the cold weather, and indicate that their names appear more than once in the table.

Locality.		Name of Grazier.	Animals he is authorized to graze throughout the year and was grazing on 25th May 1887.	Animals he is authorized to graze from 1st April to 31st October in each year, on expiry of 12 months without a conviction of self or servant under the Forest Act, with effect from 1st June 1887.	Remarks.
Beat.	Compartment.				
Senchal ...	.....	Kinchin	8 cows ...	11 cows ...	Rains. In cold weather Tiger Hill.
	.....	Buxoo	14 „ ...	19 „ ...	Do. Ditto ditto.
	.....	Ditto	6 „ ...	8 „ ...	Rains. In cold weather Sikkim.
	.....	Jurmi	14 „ ...	19 „ ...	Do. Ditto Rangjo.
	.....	Dubu	8 „ ...	11 „ ...	Do. Ditto Rangbi.
	.....	Anjoong	14 „ ...	19 „ ...	Do. Ditto Tiger Hill and Rangbi.
	.....	Karoo	3 „ ...	4 „ ...	Rains. In cold weather Nai.
Balasan ...	2	Rinchadan ...	6 „ ...	8 „ ...	Do. Ditto Chongtong.
	3 } 5 }	Minjor	12 „	16 „	
	3	Peshi	4 „	5 „	
	4	Kheka	8 „	11 „	
	.....	Tasi	4 „ ...	5 „ ...	Rains. In cold weather Palongdong.
Palongdong ...	2	Myla Dhoji ...	6 „ ...	8 „ ...	Rains. In cold weather Permaigiri.
	2	*Tasi*	*4* „ ...	.....	Cold weather. In rains Balasan.
	3	Kenchoo	3 „	4 cows	
	3	Labjantenjin ...	4 „	5 „	
	3	Nimsring... ...	3 „	4 „	
	3	Prem	4 „	5 „	
	3	Depenjo	4 „	5 „	
	4	Sreebunsoo ...	4 „	5 „	
Pugraingbong ...	.....	Runsoor	6 „	8 „	
Permaigiri ...	.....	Chitani	6 „	8 „	
	.....	Hoonkhoor ...	4 „	5 „	
	.....	*Padri Lama* ...	*4* „ ...	.....	Cold weather. In rains Chongtong.
	.....	Paunday	4 „	5 cows	
	.....	Shamduk... ...	3 „	4 „	
	.....	*Myla Dhoji* ...	*6* „ ...	.....	Cold weather. In rains Palongdong.
Chongtong ...	1	Sreedhoji... ...	5 „	7 cows	
	1	Dhojipupu ...	4 „	5 „	
	.....	Dhengoor ...	5 „ ...	7 „ ...	Rains. In cold weather Nai.
	2	Jeta Dhoji ...	3 „	4 „	
	3	*Rinchadan* ..	*6* „ ...	.....	Cold weather. In rains Balasan.
	3	Chripen (Dechen's widow).	5 „ ...	7 cows	
	3	Padri Lama ...	4 „ ...	5 „ ...	Rains. In cold weather Permaigiri.
	.....	Hoonkun Bopie ...	4 „ ...	5 „	
Nai	1	*Karoo*	*3* „ ...	.....	Cold weather. In rains Senchal.
	1	Karoo (son of Ettoo)...	5 „ ...	7 cows	
	2	Ahjook	4 „ ...	5 „	
	2	Sincoma	3 „ ...	4 „	
	.....	Chidiome (widow of Adhoo).	4 „ ...	5 „	
	3	Dhoji	6 „ ...	8 „	
	3	*Dhengoor* ...	*5* „ ...	.....	Cold weather. In rains Chongtong.
Tukdah ...	.....	*Baloo*	*4* „ ...	.....	Ditto. In rains Rangjo.
	.....	Achoong ... „	4 „ ...	5 cows	
	.....	*Khadma*	*10* „ ...	.....	Ditto. Do. do.
	.. ...	Mindorji	4 „ ...	5 cows	
	.....	Aphew	3 „ ...	4 „	
	.....	Ujin Chiri ...	4 „ ...	5 „	
Rangjo ...	1 } 2 }	Gyechen (*alias* Dongay)	7 „ ...	9 „	
	5 } 4 }	Khadma	10 „ ...	13 „ ...	Rains. In cold weather Tukdah.
	2	Baloo	4 „ ...	5 „ ...	Do. Ditto ditto.
	2 } 5 }	*Jurmi Bhutia* ...	*14* „ ...	.....	Cold weather. In rains Senchal.
	3	Tobgya	4 „ ...	5 cows	
	5	Buxoo	4 „ ...	5 „ ...	During rains only. In cold weather goes to Sikkim.

APPENDIX 1—*concluded.*

NOTE.—The entries in italics have reference to graziers who are permitted to shift their *bathans* for the cold weather and indicate that their names appear more than once in the table.

Locality.		Name of Grazier.	Animals he is authorized to graze throughout the year and was grazing on 25th May 1887.	Animals he is authorized to graze from 1st April to 31st October in each year, on expiry of 12 months without a conviction of self or servant under the Forest Act, with effect from 1st June 1887.	Remarks.
Beat.	Compartment.				
Rangjo ...	6	Ujain (*alias* Ujin Chipi)	6 cows ...	8 cows ...	Rains. In cold weather Tiger Hill.
	5	*Ringay* (alias *Rinjin*)	*6* „ ...	.....	Cold weather. In rains Tiger Hill.
	.....	Chaundi	6 „ ...	8 cows	
	.....	Siring Sirdar ...	5 „ ...	7 „	
Tiger Hill ...	3	*Anjoong*	.....	.....	A third bathan in Rangbi.
	4	*Ujain (Ujin Chipi)* ...	*6* cows ...	.....	Cold weather. In rains Rangjo.
	4	Ringay (Rinjin) ...	6 „ ...	8 cows ...	Rains. In cold weather Rangjo.
	5	*Kinchin*	*8* „ ...	.....	Cold weather. In rains Senchal.
	1	*Buxoo*	*14* „ ...	.....	Ditto. Do. ditto.
Rangbi ...	1	*Dubu*	*8* „ ...	.....	Ditto. Do. ditto.
	2	*Anjoong Bhutia* ...	*14* „ ...	.....	Ditto. Do. ditto.
Chattackpur ...	.....	Jangbir Havildar ...	22 bullocks...	.....	Cart cattle.
	.....	Lall Dhar Ram ...	14 „ ...	.....	
	.....	Sring Bhutia ...	2 „ ...	.....	
	.....	Karma	2 „ ...	.....	
	.....	Kajiman	4 „ ...	.....	

APPENDIX 2.

GRAZING RULES.

NOTIFICATION.

The 10th October 1885.—Under the powers conferred upon him by section 75 (*d*) of Act VII of 1878, the Lieutenant-Governor is pleased to make the following rules to regulate grazing in the Reserved Forests of Darjeeling.

Rules.

1. Grazing in the Reserved Forests of the Darjeeling Forest Sub-Division, other than those north of the Little Rangit river, is prohibited, except under the following rules and conditions.

2. Permits for grazing will be issued by the Forest Officers in charge of ranges hereinafter referred to as range officers, for the calendar month, on payment of such fees as may from time to time be fixed by the Conservator of Forests, with the sanction of Government. The permits will fix the block or locality in which the privilege of grazing may be exercised: such blocks or localities shall be selected by the Divisional Forest Officer with regard to the protection of the forest, the convenience of the permit-holder, and the existing orders of Government on the subject, or orders which may in future be issued by Government.

3. He shall not be obliged to allow grazing in any given block to more than one head of cattle to every 10 acres of area; but, on the other hand, may locate any number of cattle in a block, provided the area available for grazing in that block be five acres per head.

4. Grazing will be reserved for milk cattle required for the supply of milk and butter to the public in Darjeeling, Jellapahar, and Jore Bungalow, and for a number of draught cattle not exceeding 150 head.

The Divisional Forest Officer will not be bound to provide grazing for any cattle other than the above, but may, with the sanction of the Conservator, allow temporarily a larger number if he considers it can be done with due regard to the interest of the forest.

5. The construction of grazing camps, enclosures, or bathans is prohibited, except on the sites pointed out by the Divisional Forest Officer. Sites for two bathans shall be allowed to each grazier whose permit allows him to graze more than five head of cattle. Should more be required, or a change of site applied for, the question to be decided in case of dispute by the Divisional Forest Officer and Deputy Commissioner.

6. In the cases in which the two bathans allotted to a permit-holder lie in two different blocks, he shall not leave one for the other without previous notice to the range officer, and without having the permission of this officer endorsed on the permit.

7. For the construction of, and repairs to, these bathans, permit-holders may utilise such dry fallen wood as may be found in the vicinity; and, with the permission of the range

APPENDIX 2—*continued.*

officer, canes and bamboos. Should sufficient dry wood not be available, the Divisional Forest Officer, or his subordinate under his orders, may mark and allow to be cut for this purpose trees of the less valuable kinds of smaller girth than 18 inches on pre-payment of annas 4 per tree. No charge will be made for canes, bamboos, or dry wood.

8. The Divisional Forest Officer may prohibit the construction of bathans for draught cattle.

9. The cutting and lopping of trees is prohibited. This rule does not apply to bamboos, creepers, and the trees known as *Dung-Dung* (Brassiopsis hamla) and *Dudhia* (Ficus gemella). * *See below.*

10. Payment for permits for grazing will be made in advance on the first day of the month, and in case of payment not being made by the 10th, double fees may be charged; if not made by the 20th, the cattle may be driven out of the forest, or the defaulters prosecuted under section 25 (*d*) of the Indian Forest Act, and the issue of a permit refused, subject to appeal to the Conservator. Should the Conservator consider it desirable, payments may be made quarterly, but subject to the above provisions as to payment.

11. Buffaloes, goats, and sheep will not be allowed grazing in the forests forming the circles to be worked for the supply of fuel and timber to Darjeeling, Jellapahar, and tea plantations.

12. All permits will be kept at the bathans, and will be produced for inspection whenever called for by any Forest or Police officer. On the expiry of the term for which a permit is issued, it shall be returned to the office of issue, and a fresh permit may be refused unless the applicant produces his expiring or expired permit.

13. The range officer shall, after issue of a notice to any holder of a grazing permit, copy of which shall be sent for record to the Divisional Officer, require that on a day fixed, not less than seven days from the date of the notice, he shall have all his cattle within his bathan to allow of their number being checked with his permit. Such inspections shall not be made oftener than four times in the year: they shall ordinarily be held between the hours of 7 and 10 A. M. so as not to cause unnecessary inconvenience to the permit-holder, who may, however, by giving at least two days' notice to the range officer, fix any other hour between 8 A. M. and 6 P. M. of the day appointed by the notice that may be more convenient to himself. Should the permit-holder refuse or neglect to comply with the terms of the notice referred to above, or otherwise hinder the thorough inspection of his cattle, the issue to him of a fresh permit may be refused until he has complied with the requirements of this rule.

The Conservator may exempt by name, class, or locality any person or persons from the requirements of the preceding clause.

Nothing in this rule shall be held to debar any Forest or Police officer from visiting and inspecting a bathan or cattle-shed or pen within the Reserved Forests, or the cattle grazing in the forest.

14. Any Forest Officer attached to the Darjeeling Forest Division, to whom the range officer is subordinate, may exercise any of the powers conferred on a range officer by these rules.

H. H. RISLEY,
Offg. Secretary to the Govt. of Bengal.

NOTIFICATION.

* *The 19th November* 1885.—The Lieutenant-Governor is pleased to make the following addition to rule 9 of the rules for the regulation of grazing in the Reserved Forests of Darjeeling, published by Notification dated the 10th of October 1885 in the *Calcutta Gazette* of the 14th ultimo:—

The prohibition of cutting and lopping trees does not apply to the shrub known a Phulsari (*Rubus lineatus*).

A. P. MACDONNELL,
Secretary to the Govt. of Bengal.

See *Calcutta Gazettes* of 14th October 1885, Part I, p. 937; and of 25th November 1885, Part I, p. 1192; also see letter No. 1956 T—R of 17th October 1885, from the Secretary to the Government of Bengal, Revenue Department, Forests, to the Conservator, forwarding the rules and instructions concerning their enforcement.

APPENDIX 3.

FORECAST FOR 1888-89 TO 1890-91.

CHECK-AREA A.

APPENDIX 3 (a).

ENUMERATION OF STOCK.

Area of enumeration—the whole.

ENUMERATION OF TREES.

WESTERN CIRCLE.

CLASS.	DIAMETERS. 1	1·5	2	2·5	3	3·5	4	4·5	Total.
Buk, Phalat, and Katus	2,060	876	470	507	203	218	303	436	5,073
Champ, Pipli, and Kabashi	618	395	361	337	155	112	82	76	2,136
Kharani	2,772	312	41	13	7	1	1	.....	3,147
Others	8,109	3,053	1,538	948	378	173	149	179	14,527
Total ...	13,559	4,636	2,410	1,805	743	504	535	691	24,883

EASTERN CIRCLE.

Buk, Phalat, and Katus	2,660	926	610	818	275	243	425	319	6,276
Champ, Pipli, and Kabashi	612	436	378	504	164	119	84	69	2,366
Kharani	2,461	221	56	26	7	2	2	1	2,776
Others...	8,129	3,509	1,831	1,270	362	258	175	283	15,816
Total ...	13,862	5,092	2,875	2,618	808	622	686	671	27,234

Chindia and Dudila, of which 1,889 trees were counted in the Western Circle and 633 in the Eastern, are omitted for the reasons given in paragraph 58 of the Working Plan.

APPENDIX 3 (b).

FORECAST FOR 1888-89 TO 1890-91.

Selection of Type trees.

WESTERN CIRCLE.

1 Name of class.	2 Diameter at 4′ from ground.	3 Square of diameter.	4 Number of trees.	5 Product of column 3 by column 4.	6 Total of column 5.	Square of diameter of average tree. Quotient of column 6 by column 4.	Simple diameter of average tree.
Buk, Phalat and Katus.	1	1·00	2,060	2,060·00	27,254·25	5·37	2·32
	1·5	2·25	876	1,971·00			
	2	4·00	470	1,880·00			
	2·5	6·25	507	3,168·75			
	3	9·00	203	1,827·00			
	3·5	12·25	218	2,670·50			
	4	16·00	303	4,848·00			
	4·5	20·25	436	8,829·00			
			5,073				
Champ, Pipli and Kabashi.	1	1·00	618	618·00	10,675·00	5·00	2·24
	1·5	2·25	395	888·75			
	2	4·00	361	1,444·00			
	2·5	6·25	337	2,106·25			
	3	9·00	155	1,395·00			
	3·5	12·25	112	1,372·00			
	4	16·00	82	1,312·00			
	4·5	20·25	76	1,539·00			
			2,136				
Kharani ...	1	1·00	2,772	2,772·00	3,810·50	1·21	1·10
	1·5	2·25	312	702·00			
	2	4·00	41	164·00			
	2·5	6·25	13	81·25			
	3	9·00	7	63·00			
	3·5	12·25	1	12·25			
	4	16·00	1	16·00			
	4·5	20·25	....	.....			
			3,147				
Others ...	1	1·00	8,109	8,109·00	38,585·25	2·66	1·63
	1·5	2·25	3,053	6,869·25			
	2	4·00	1,538	6,152·00			
	2·5	6·25	948	5,925·00			
	3	9·00	378	3,402·00			
	3·5	12·25	173	2,119·25			
	4	16·00	149	2,384·00			
	4·5	20·25	179	3,624·75			
			14,527				

EASTERN CIRCLE.

1 Name of class.	2 Diameter at 4′ from ground.	3 Square of diameter.	4 Number of trees.	5 Product of column 3 by column 4.	6 Total of column 5.	Square of diameter of average tree. Quotient of column 6 by column 4.	Simple diameter of average tree.
Buk, Phalat and Katus.	1	1·00	2,660	2,660·00	31,007·50	4·94	2·22
	1·5	2·25	926	2,083·50			
	2	4·00	610	2,440·00			
	2·5	6·25	818	5,112·50			
	3	9·00	275	2,475·00			
	3·5	12·25	243	2,976·75			
	4	16·00	425	6,800·00			
	4·5	20·25	319	6,459·75			
			6,276				
Champ, Pipli and Kabashi.	1	1·00	612	612·00	11,930·00	5·04	2·24
	1·5	2·25	436	981·00			
	2	4·00	378	1,512·00			
	2·5	6·25	504	3,150·00			
	3	9·00	164	1,476·00			
	3·5	12·25	119	1,457·75			
	4	16·00	84	1,344·00			
	4·5	20·25	69	1,397·25			
			2,366				
Kharani ...	1	1·00	2,461	2,461·00	3,484·50	1·26	1·12
	1·5	2·25	221	497·25			
	2	4·00	56	224·00			
	2·5	6·25	26	162·50			
	3	9·00	7	63·00			
	3·5	12·25	2	24·50			
	4	16·00	2	32·00			
	4·5	20·25	1	20·25			
			2,776				
Others ...	1	1·00	8,129	8,129·00	46,214·75	2·92	1·71
	1·5	2·25	3,509	7,895·25			
	2	4·00	1,831	7,324·00			
	2·5	6·25	1,270	7,937·50			
	3	9·00	362	3,258·00			
	3·5	12·25	258	3,160·50			
	4	16·00	175	2,800·00			
	4·5	20·25	282	5,710·50			
			15,816				

APPENDIX 8 (c).

FORECAST FOR THE THREE YEARS 1888-89, 1889-90, 1890-91.

Western Circle.

Group or "Check-area."	Area enumerated.	Trees enumerated. Class.	Number.	Yield of the mean of the type trees in cords.	Product of column 4 × column 5.	Remarks.
	2	3	4	5	6	
Balasan 6, 7	The whole	Buk, Phalat, and Katus	5,073	2·0698	10,500	Reducing by 20 per cent. the total of column 6 to allow for the trees to be left standing at the "second" felling as prescribed in paragraph 51 of the working plan, the forecast for each of the above years 1888-89, 1889-90, 1890-91 will be one-sixth of the remainder, or 3,838 cords of firewood.
		Champ, Pipli, and Kabashi.	2,136	2·1502	4,593	
		Kharani	3,147	0·4479	1,410	
Palongdong 1, 2 ...		Others	14,527	0·8455	12,283	
		Total in cords ...	.....	.....	28,786	

Eastern Circle.

Rangirum 4, 5, 1, 2 ...	The whole	Buk, Phalat, and Katus	6,276	2·0698	12,990	Making a similar reduction, the forecast for each of the years 1888-89, 1889-90, 1890-91 will be 4,359 cords of firewood.
		Champ, Pipli, and Kabashi.	2,306	2·1502	5,087	
Dawaipani 1		Kharani	2,776	0·4479	1,243	
		Others	15,816	0·8455	13,372	
		Total in cords ...	.....	.....	32,692	

Note.—In this case the trees on the whole of the "check area" were enumerated. In cases where, as allowed by the working plan, the enumeration extends over a number of acres only, the total of column 6 will be multiplied by the quotient of the stocked area of the group divided by this area enumerated. Thus, in the present case, had 50 acres only been enumerated in the Western Circle, the figure 374 (the area stocked in acres), divided by 50, would give 7·48, and the total of column 6 would have been multiplied by 7·48 before the making of the last part of the calculation.

APPENDIX 4.

ESTIMATE OF THE GENERAL CAPABILITY.

Enumeration of Stock over 2,743 acres.

Class.	1	1·5	2	2·5	3	3·5	4	4·5	Total.
Buk and phalat	11,201	4,010	2,264	3,121	1,121	954	1,544	947	25,162
Katus	1,871	666	500	831	372	504	545	395	5,684
Champ	1,643	1,043	868	1,038	485	355	222	148	5,782
Pipli	47	34	12	18	10	6	10	8	145
Kabashi	2,043	1,328	1,104	1,637	664	292	312	112	7,492
Kharani	10,789	1,381	268	165	68	16	11	2	12,700
Kawala and Lali	23,998	9,545	5,179	4,234	1,109	535	283	90	44,973
Chindia and Dudila	6,475	2,440	944	543	90	23	13	5	10,533
Others	36,230	12,486	5,201	4,130	1,144	719	611	620	61,141
Total ...	94,297	32,933	16,340	15,717	5,043	3,404	3,551	2,327	173,612

ESTIMATE OF THE GENERAL CAPABILITY.

Calculation of the Growing Stock in the Darjeeling Forests.

Western and Eastern Working Circles.

Compartments enumerated.	Area acres.	Trees enumerated. Class.	Number.	Diameter of type tree feet.	Yield of the mean of the type trees in cords.	Product of column 4 by column 6.	Remarks.
1	2	3	4	5	6	7	8
Balasan 1-7	805	Buk and phalat ...	25,162	2·13	1·9073	47,991	
Palongdong 1-4... ...	849	Katus	5,684	2·54	2·3617	13,424	
Permaigiri 1-2	307	Champ	5,782	2·24	2·1640	12,826	
Rangirum 1-5	388	Pipli	145	2·30			
Dawaipani 1-3	394	Kabashi	7,492	2·21	2·1502	16,109	
		Kharani	12,700	1·16	0·4479	5,689	
		Kawala and Lali ...	44,973	1·60	0·9798	44,065	
		Chindia and Dudila ...	10,533	1·40	0·5004	5,271	
		Others	61,141	1·58	0·8455	51,695	
Total ...	2,743		173,612	.....	.....	197,070	
					Deduct Chindia and Dudila ...	5,271	
					Balance ...	191,799	

APPENDIX 4—*concluded.*

This gives a stock per acre of $\frac{191{\cdot}799}{2{\cdot}745}$ or 70 cords; and multiplying this figure by 18,023, the area in acres of the two circles, and dividing the product by 108, the length of the rotation, a quantity of 11,681 cords is obtained. From this should be made a deduction of about 20 per cent. to allow of leaving the trees standing in the "second" felling prescribed by paragraph 51 of the working plan. Thus a general annual capability of 9,000 cords is obtained for the outturn of the principal fellings, but the quantity to be cut each year will be regulated in the manner prescribed in the Working Plan.

APPENDIX 5.

DESCRIPTION OF COMPARTMENT BOUNDARY LINES.

The numbers of the Boundary Pillars are those of the Boundary Survey Maps of 1883, 1884, 1885.

Balasan beat—

7—1. Poobong-Balasan. The Balasan river.
1—2. Starts from near boundary pillar No. 1 (146), that is, from the foot of the spur on the other (E) side little jhora, which at this point on the boundary line runs into the Balasan river.
2—3. Starts from boundary pillar No. 7 (140). Runs up spur and joins cart road 390 paces east of Dungdungia camping ground.
3—4. Starts from boundary pillar No. 9 (138). Follows spur, joining road at Dungdungia.
4—5. Stars from boundary pillar No. 11 (136). Follows spur, joining road 530 paces east of 11th mile-post.
5—6. From boundary pillar No. 13 (134) up spur to 11th mile-post.
6—7. Starts from boundary pillar No. 14 (133). Runs up spur joining road a few paces south-west of Sukiapokri.

Palongdong beat—

7—1. Balasan-Palongdong. Starts from boundary pillar No. 18 (129), and runs up path and spur joining road near its bend beyond Sukiapokri.
1—2. The jhora rising a few yards below the road on the 7-1 line and cutting boundary east of boundary pillar No 5 (124).
2—3 Starts from boundary pillar, No. 8, and comes out on road 215 paces east of Jor Pokri location boundary. It runs up a spur and also follows a path from bottom to near the road.
3—4. Starts from a point on Raiam jhora at foot of a spur and runs up a spur to the commencement of a path 250 paces west of the saddle immediately west of Jor Pokri rest-house.
4. The Raiam jhora.

Permaigiri beat—

6—1. Chongtong-Permaigiri. Starts from boundary pillar No. 6 (59), and runs up spur to the road, passing over a knoll above road, joining road 300 paces east of Sukiapokri A path follows same spur to near the top and turns off towards west.
1—2. Starts from mile-post No 12 and runs down into the stream, crossing forest boundary between boundary pillars 5 and 6. This stream, though small, has rocky, precipitous banks, and the trees on its banks being scarce, few are marked.
2—3. Starts from boundary pillar No. 5 (60) above Permaigiri village. Runs up spur and path to Jor Pokri, issuing at the location boundary pillar No 19 near the pound.
3 Starts from boundary between boundary pillars Nos 3 (62) and 4 (61). Runs up spur and path to the road, which it joins at its first bend beyond the turning to Nagri.

Chongtong beat—

3—1. Rishihat-Chongtong. The Lepcha-Jagat-Chongtong road which crosses the forest boundary at boundary pillar No. 17 (42).
1—2. Starts from road 80 yards west of 2-3, Balasan, and follows the stream to the forest boundary which it meets at bend of Lingia-Tumsong Road. The trees on the upper part as far as the Lepcha-Jagat-Tumsong road are painted.
2—3. Starts from boundary pillar No 15 (44) on west side of the road from Tumsong tea estate to Lepcha Jagat. Runs up spur and path to road at mile-post No. 10.

APPENDIX 5—*continued.*

3—4. Starts from Dung-dungia camping ground (opposite line 3—4, Balasan) runs down into the stream.

4—5. The road from the Mim tea estate to the main road.

5—6. Starts from boundary pillar No. 3; runs up spur to the road passing over a knoll, reaching road 110 paces east of the 6—1 line and 450 paces west of 11th mile-post; a path follows the same spur nearly the whole way.

Rishihat Beat—

3—1. Nai-Rishihat runs up the Nai Jhora about 200 yards, and then follows a spur up to the Nai Beat inspection path.

1—2 Starts from boundary pillar No. 11 on the spur near Rishihat-Lepcha Jagat road, and runs up the spur (not this road) to the main road at mile-post No. 9, cutting the forest bungalow. This line, except in its upper portion, coincides with a path.

2—3. Starts from boundary pillar No. 7, runs up spur issuing on the Lepcha Jagat Tumsong Road, about 480 yards from top.

Tungsong Poobong Beat—

1. Branch of Binj Jhora, rising east of Goompahar depôt.

1—2. Starts from road, 280 paces east of 6th mile-post, and follows spur to bottom.

2—3. Starts from top of Tungsong Road, 350 paces west of 6th mile-post, which is in a jhora; runs down spur till near the forest boundary, when it runs down into a jhora on the west of that spur This jhora is the stream immediately east of the spur called Minjharidara on which spur is the old boundary pillar 176, and about three chains below it is the pucka boundary settlement pillar of 1886. A path coincides with the upper part of this line.

3—4. Starts from boundary pillar 173, near a pucka boundary pillar at bend in the Tungsong road; follows up spur to the Cart Road. A path runs up same spur.

4—5. Starts from surveyor's trace of 1886 on spur above boundary pillar 168; follows spur till near the road, reaching road 90 paces east of mile-post No. 7; passes over a precipitous rock near centre.

5—6. Starts from pucka pillar on boundary near the Posam Jhora east of boundary pillar No. 1 (166); follows spur and joins cart road 250 paces east of 8th mile-post and the turning up to Goom Rock.

6—7. Starts from boundary pillar No. 5 (162); follows spur and joins cart road 170 paces east of Poobong spur path. An inferior path follows this spur.

7—8. Starts from boundary pillar No. 13 and follows up the Poobong spur. A good path coincides with line almost up to top. Boundary pillar 12 is situated on upper side of road to Poobong. Between boundary pillar. Nos 12 and 11 is, just below the road, a triangular stone and mortar boundary pillar.

8—7. Starts from foot of spur on the Balasan River; follows spur to join the 7—8 line, a short distance below the cart road.

Nai Beat—

3—1. Goom-Nai starts from boundary pillar No. 1 (28); runs up Barbuttia spur and path to the Nai inspection path.

1—2. Starts from boundary pillar No. 2 (29); runs up spur to the Nai inspection path, 900 yards west of Barbuttia spur.

2—3. Starts from boundary pillar No. 1 (30) and runs up Balukop spur to the Nai inspection path.

4—5. A continuation of 2—3 up Balukop spur, descending on south side of ridge to the old Goompahar Road; along that road for 3,090 feet to the cart road.

Note.—The mile-posts on the Goompahar road are liable to be shifted.

Goom Beat—

1. The Kuhil jhora from the Darjeeling Jor Bungalow cart road to boundary pillar No. 7 (22) on the Bloomfield-Rishihat Road.

1—2. Starts from boundary pillar No. 7 (22) on the Bloomfield Rishihat Road; follows spur and path to boundary pillar No. 15 of Batassi Dara village boundary.

2—3. Starts from Goompahar Ranger's house and runs down to the boundary at boundary pillar No. 7 (22) on the Bloomfield Rishihat road.

Senchal Beat—

The Senchal beat consists of one compartment bounded on the north and west by the Jor Bungalow Pashok road on the south by the proposed Military Department boundary; on the east by the spur from the 3rd mile-post to Tiger Hill. G. T. S.

APPENDIX 5—*continued.*

Rangnu Beat—

1. The Rangnu Jhora.
1—2. The forest inspection path from where it crosses the Senchal jhora, near the bottom of the Rangnu spur, up that spur to the Jor Bungalow Pashok road.
2—3. Starts from a point on the Senchal Jhora, situated about half a mile below the junction of the Rangirum beat lower boundary with that jhora, and runs up a minor spur over steep and bad ground through scrub jungle.

Rangirum Beat—

3—3. Rangnu-Rangirum. The Senchal Jhora.
3—4. From boundary pillar No. 7 up spur to the Rangirum road, 300 yards below its junction with the Jor Bungalow Pashok road.
4—5. From boundary pillar No. 14, runs up a spur joining a path after a short distance, and continuing up the spur and path, meets the Rangirum road opposite Nos. 1-2 Rangirum.
5. The line separating No. 5 Rangirum from the Dawaipani block is the Rangirum-Alubari road.
1—2. Runs up a spur from the Rangirum road opposite the turning of a short cut to Rev. Mr. Wilson's Bungalow, and the 4—5 line, meeting the Jor Bungalow Pashok road 400 paces west of the 3rd mile-post.
1—4. The Rangirum road.
2—5. Ditto ditto.

Dawaipani Beat—

The line separating 2 and 5 Rangirum from 1 Dawaipani is the Alubari-Rangirum road to a point above the forest bungalow; then a line up a spur and path meeting the Jor bungalow Pashok road.
1—2. From the Dawaipani beat inspection path up a spur to the Jor Bungalow, Pashok road, meeting that road 380 paces east of the Rangirum-Dawaipani line.
2—3. From the Dawaipani inspection path up a spur to the Jor Bungalow Pashok road.
3. The stream claimed by the Land Mortgage Bank as the boundary between the reserved forest and the Mineral Spring Tea Estate. This stream rises at the top of the road leading to the Mineral Spring Tea Estate.
4. The Rangirum-Alubari road ; then the boundary of the reserved forest as far as the Rangnu Jhora.
4—5. From a point at the junction of the Kejok and Rangnu Jhoras on the side of a path up the spur to the west of the former Jhora to the Dawaipani inspection path.
5—6. From the junction of the Pashundi and Kejok Jhoras up a spur to the Dawaipani inspection path.
6. The Pashandi Jhora, then the boundary between the reserved forestand Charles Field Tea Estate, then the stream claimed by the Land Mortgage Bank as the boundary between the reserved forest and the Mineral Spring Tea Estate.

Rungjo Beat—

1. From boundary pillar No. 146 on lower boundary up a path to the Poomong road, and then that road to the Jor Bungalow Pashok road.
1—2. From boundary pillar No. 151 on lower boundary to the Jor Bungalow Pashok road 300 paces east of road to "Mineral Springs." A path coincides with the upper part of this line.
2—3. From boundary pillar No. 154 up spur and path, finally descending to the Jor Bungalow Pashok road, 200 paces east of the Rangirum Dawaipani beat line.
3—4. From a point on the Rungjo Jhora up spur and path, running into line 2—3, 100 yards from the Jor Bungalow Pashok road.
4—5. From a point higher up the Rungjo river on its left bank up a spur, running into the 3—4 line about 200 yards from the road.
5—6. From the foot of the 4—5 line the Rungjo river for about 50 yards, then a line running up a stream, and then a spur to the Jor Bungalow Sureil road.
6—7. From a point on the right bank of the Rungjo river up a spur to the Jor Bungalow Sureil road, meeting that road 1,200 yards east of Rungjo river and 1,600 yards west of road to Rangbi.
7. The forest boundary.

APPENDIX 5—*continued.*

Tiger Hill Beat.—

1. Senchal Tiger Hill. The spur from the 3rd mile-post to Tiger Hill G.T.S. as far as the proposed military boundary, and then that boundary to the ridge.

1—2. From a point on the Sureil road 600 paces west of the Rungjo river and about 50 east of the 5—6 Rungjo line up a spur to a point on the 1 line 360 yards from the top.

2—3. Starts from Sureil road 80 paces east of Rungjo river, and follows the spur to the ridge about 200 yards north-west of Senchal G.T.S.

3—4. Starts from the Sureil road about half a mile east of the Rungjo river, and follows spur to the Tiger Hill Rangbi line, which it meets about 930 yards from road.

Rangbi Beat—

The Tiger Hill Rangbi line follows spur from the top of the Rangbi road to Senchal G.T.S.

1—2. From boundary pillar No. 17 up a spur to the Tiger Hill Rangbi line, meeting that line at a point 1,500 yards from the road.

2—3. From boundary pillar No. 7 up spur to the Tiger Hill Rangbi line, which it meets 400 yards above 1—2.

3—4. Starts from road on the north side of the Rangbi river, and follows spur till it meets the 2—3 line.

4—5. Starts from the Rangbi river about 50 yards above the Rangbi road, and follows spur till it meets the 2—3 line.

5—6. A branch of the Rangbi river and then a line to meet the Tiger Hill Rangbi line.

6—7. Starts from a point on the left bank of the Bangbi river above 4—5, and then follows a spur to the ridge.

Rishap Beat—

The Rangbi-Rishap line is the Rangbi Jhora.

1—2. Leaves the Sureil road at boundary pillar No. 39 immediately south of the Rangbi Jhora, and runs up spur to the Rishap spur.

2—3. Starts from the Sureil road at boundary pillar No. 32, and runs up spur to the Rishap spur.

3—4. Starts from the Sureil road at boundary pillar No. 25, and runs up spur to the Rishap spur.

4—5. Starts from the Sureil road at boundary pillar No. 16, and runs up spur to the Rishap spur.

Sureil Beat—

The Rishap-Sureil boundary is the path running up Rishap spur; on this path terminate the compartment lines of the Rishap and Sureil Beats.

1—2. Starts from the Sureil-Kurseong road between boundary pillars Nos. 12 and 13; runs up spur to the Rishap spur. The upper part of this line is steep

2—3. Starts from the Sureil-Kurseong road between boundary pillars Nos. 8 and 9; runs up spur over rocky and precipitous ground covered with cane to the Rishap spur.

3—4. Starts from Sureil-Kurseong Road between boundary pillars Nos. 3 and 4, about 450 yards north of the guard's house at Mamrim; runs up spur to the Rishap spur.

4—5. Leaves the Sureil-Kurseong Road above the zigzags, and follows spur reaching the Rishap spur at its highest point.

Mamrim Beat—

The Sureil-Mamrim line is the Sureil-Kurseong road.

1—2. Leaves the forest boundary at post No. 26 and follows spur to the Sureil-Kurseong road.

2—3. Starts from boundary pillar No. 22, follows spur to the ridge and the old military road, which it reaches south of the turning to Sureil. A path follows part of this line.

3—4. Starts from forest boundary at boundary pillar No. 15 and follows spur to the road down the Babukhola ridge.

4. From boundary pillar No. 1 (stone-post No. 66); the Babukhola road.

Dooteria Beat—

1—2. Starting from a point on the Binj Jhora up spur, crossing the Dooteria inspection path and coming out on the cart road location 300 paces south of the Ranger's house.

2—3. From a landslip on the Binj Jhora up spur and path, crossing Dooteria inspection path to the road forming south boundary of the Dooteria forest 490 yards from the top.

APPENDIX 5—*continued.*

Rangbul Beat—

1—2. Follows the spur with zig-zag road from the Cart Road across the old military road to the Senchal road.

2—3. Leaves Cart Road nearly opposite south boundary of Dooteria forest; follows the inspection path up spur past Rangbul nursery; crosses old military road at the forest rest-house, and follows spur to the proposed Military Department boundary.

3—4. Leaves Cart Road at the stream east of the Rangbul halting shed; follows the eastern branch of the stream to the old military road, and continues up to the proposed Military Department boundary.

Sonada Beat—

The Rangbul-Sonada boundary is the Rangbul Jhora.

1—2. Leaves Cart Road near the double telegraph post north of boundary pillar No. 3 up spur to old military road a few yards south of 14th mile-post; continues up spur to the ridge.

2—3. Starts from boundary pillar No. 5 on western boundary of Sonada forest; follows spur and path to old military road and continues up spur to the ridge.

Pachim Beat—

3—1. Sonada-Pachim. A well-defined Jhora, crossing the boundary between boundary pillars 12 and 1, forms the boundary between these two beats.

1—2. Leaves the old military road 22 yards east of the 12th mile-post, and follows spur to ridge.

2—3. Leaves old military road on the spur 140 yards west of 11th mile-post, and follows spur to ridge.

Chattakpur Beat—

Pachim-Chattakpur. The Runum river forms the north-west boundary of Chattakpur beat, separating it from the Pachim beat, from Ram Chunder's land, and from Rinchingtong Dhara South Beat.

1—2. Leaves cart road at a point 230 yards south of mile-post No. 11; follows spur to the ridge, crossing the old military road.

2—3. Leaves cart road south of the building location, situated some little distance north of Bamun Jhora just south of Chattakpur shed; follows spur to the ridge, crossing the old military road.

3—4. Leaves road at a point 150 yards north of boundary of location situated to the south of Bamun Jhora of the map; follows spur to the ridge, crossing old military road.

4—5. Leaves cart road 260 yards north of 13th mile-post, a little north of Mahadeo Jhora; follows spur to the ridge, crossing old military road.

APPENDIX 6.

Memorandum of arrangements under which the Forest Department take over forest land at Rishap from the Cinchona Department.

I.—The Cinchona Department shall have free whatever timber they require for house building, firewood, and plantation purposes generally. Passes for such produce to be obtained from the officer in charge of the Darjeeling Division, and the produce to be removed by the Cinchona Department subject to the Forest Departmental regulations in force at the time being.

II.—A number of free general permits for the removal of thatch-grass from the forests of the Kurseong Division shall be forwarded yearly on the 1st April by the officer in charge of the Kurseong Division to the Manager of the Cinchona Plantation at Mongpu.

These permits will bear no name, but the name of the person authorised by the Manager to remove the grass shall be entered by him whenever necessary.

III.—The forest officer will arrange every year for the manufacture and supply of whatever charcoal is indented for by the Manager of the Cinchona Plantation: such charcoal to be at present paid for at the rate of 8 annas per maund. This rate to be subject to revision by agreement between the Superintendent, Royal Botanical Gardens, and the Conservator of Forests whenever necessary.

IV.—Whatever roads pass through the Government forests and are kept up by the Cinchona Department shall be repaired by that Department whenever necessary without reference to the Forest Officer, such timber as may be required for roads or for resting sheds being also taken without reference.

Similar arrangements shall regulate the making and keeping up of roads by the Forest Department on cinchona land, as, for instance, on the Sitong Dunkor ridge.

NOTE.—The above memorandum was approved by the Superintendent, Royal Botanical Gardens, Howrah, in his letter No. 93 of 31st July 1880.

H. P.—Reg. No. 8773J.-100—19-9-88.